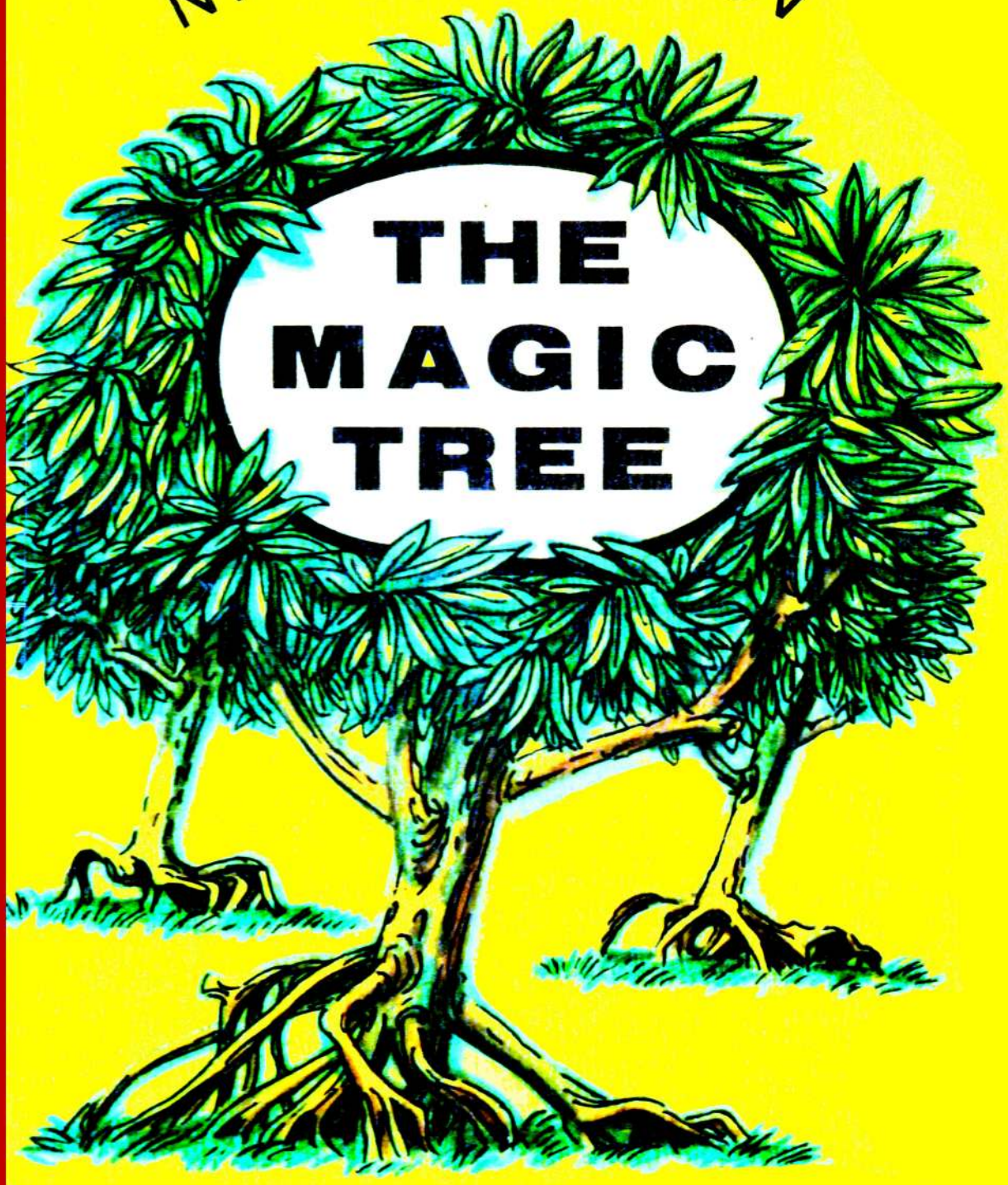
NIKOLAI OSIPOV

THE MAGIC TREE



NIKOLAI OSIPOV

THE MAGIC TREE

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THE INVINCIBLE FOREST

I'll begin by telling you a story that I heard from the trees themselves.

They say there once lived a wicked sorcerer who was so evil-tempered that he hated even himself, so you can imagine how he hated others. The longer he lived, the more nasty he became.

Once he went for a walk in the forest and, looking at the trees there, turned red with fury.

"How dared you grow taller than I?!" he stormed.

Then he called the Wind and commanded: "Swoop down on the trees and make them fall!"

The Wind swept down on the forest and started to blow with all its might. All day long it battled with the trees, all day long it tried to make them fall. But the minute it slackened, the trees straightened up again.

By evening the Wind was tired out and implored the sorcerer:

"I've no more strength left. Please let me go."

Then the wicked sorcerer turned to the Frost for aid.

"Be a good fellow and freeze those trees to death for me, will you?"

The Frost did its very best, and made the weather so cold that it got the flu itself. But the trees were none the worse for it.

Then the evil old man remembered about the greedy caterpillars. "They are just the ones to help me!" he exclaimed overjoyed.

But the trees did not wait for the caterpillars to eat their leaves. They put out a reliable guard and drove the greedy caterpillars away.

Now the sorcerer had only one helper left, it was Fire whom the old man kept hidden away in a bag. A Fire was only too happy to spring out of its hiding-place and raced towards the trees.

The red-haired bandit rushed about the forest for a long time. He licked the bark, the branches and the leaves with his fiery tongue. Finally, he, too, was tired out and crawled away like a beaten dog with its tail between its legs. The wicked old man gnashed his teeth in helpless rage, shuddered violently and fell down dead.

Since then, they say wicked sorcerers have disappeared completely, but the trees remain standing to this day.

What I have told you is a fairytale, of course. However, there's more truth in it than you can imagine. The wind, the frost, the caterpillars and the fire are all terrible enemies of the forest, but there are other enemies who are no less dangerous. Most trees are not afraid of them, though, they can put up quite a good defence.

"Defence?!" you ask in surprise. Well, if I told you how animals defend themselves you wouldn't dream of being surprised, would you? "Of course," you'd say, "I know the horse kicks, the cow butts, the dog bites, and the cat scratches. But plants are a different matter, they cannot bite or run away. An enemy can come right up to a tree and it won't even budge."

That's all true, but strange as it may seem, plants have ways of protecting themselves.

"What ways?" you ask again.

Well, you will find out when you read this book.

Whistling through the air they hit the soldiers without causing them any sharp pain because they were fired at a great distance. But a minute later these soldiers fell dead. A new batch of arrows, and new dead.

"Poisoned arrows!" cried the Dutch soldiers in terror. Neither antidotes nor prayers were of any help.

The Dutch government stood in fear of the poison, yet it wanted to discover its secret. Therefore, it sent the botanist, Everhard Rumphius, to faraway Malaya to discover the secret of the poison.

The botanist spent fifteen years in that strange land pestering everyone he came across with questions. Finally, he managed to discover that the poison was prepared from the juice of the upas-tree. Rumphius wrote down everything that people told him about the tree. The reports that the botanist sent back to his government contained details that made people very uncomfortable.

"Nothing grows around the upas-tree," wrote Rumphius, "and it poisons the very air around it. Whoever approaches the tree, be it man, beast or bird, all fall dead. A black desert stretches around the upas-tree."

A new legend, more horrible than the first, was born with regards to the deadly tree. The credulous botanist helped to spread the legend throughout the world.

It took a hundred and fifty years to dispel the myth. The upas-tree was not really such a recluse, after all. The grass grew under it and the beasts did not avoid it. But still, the tree turned out to be very poisonous. The Malays used just one or two drops for their arrowheads.

For many years the mere mention of the tree struck terror into the hearts of Europeans. Superstitious people really believed that the upas-tree was bewitched.

We know now that there was no witchcraft about it. With the years, the tree accumulated poison which is deadly for the greedy caterpillars, bark-beetles and wood-fretters. The trees that did not develop reliable means of protection died sooner. Only the most hardy survived. Among them is the upas-tree.

THE FEAST

"A charming spot!" said the commander of a detachment of French soldiers. "Mountains, valleys and vineyards, what more does a man need to have a good rest?!"

"What about food?" asked the officer responsible for supplying the troops with provisions. "What am I to feed the soldiers with?"

The commander looked at him with surprise: "I wonder at you, Captain. Have you forgotten that the vanquished country should provide the food?!"

"I see, Colonel," smiled the Captain and turned to leave.

"Wait," his commander stopped him. "Don't forget to check the water in the well for poison. You can't trust these Spaniards."

Soon there were fires burning on the outskirts of the village and the soldiers were exchanging jokes while they cooked their supper. Some were dressing the carcasses of cows with their hatchets while others were putting large hunks of meat on spits and roasting it over the coals. A delicious aroma floated over the village.

It was a fine supper, there was more than enough roast meat for all. But in the morning, none of the soldiers woke up. All of them were dead.

The misfortune was reported to Napoleon. Everybody suspected the same thing: the villagers had poisoned the water in the well.

The infuriated Emperor decided to take revenge.

"Let those who poisoned the water drink it themselves."

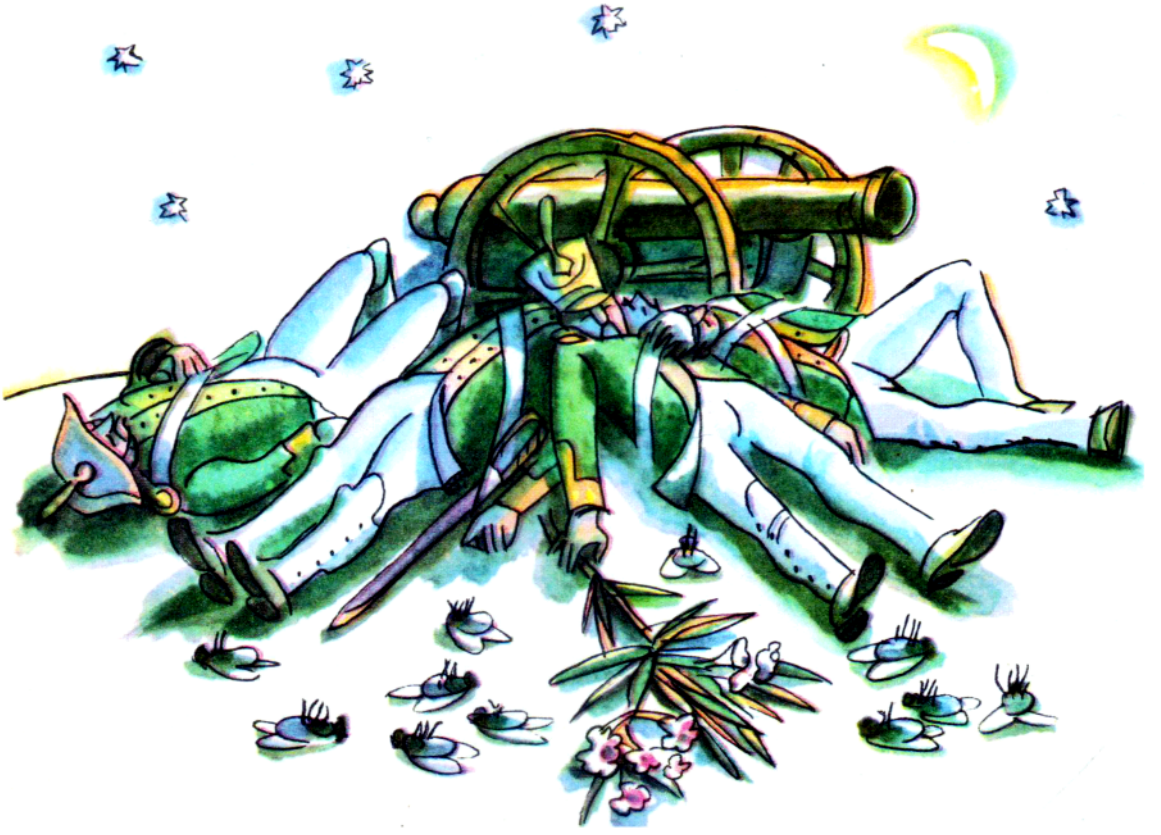
The peasants were made to drink the water from the well. But strange to say, they were none the worse for it. What did the French soldiers die of, then?

No one knows the meadows and clearings in the vicinity better than the old shepherd. Year in and year out, his sharp eyes note where the good and the bad grasses grow.

What if the cows are left without a cowherd, won't they eat any poisonous plants?

There are a lot of buttercups among the green grass that covers the meadow where the cattle graze, but the cows never touch them. Even the silly calves and kids walk round the bright flowers because they are terribly bitter.

The tender sprouts of the lesser celandine, the heralds of spring, appear when the snow still lies in the fields. They look juicy and



appetising, while all around there is not a single blade of grass that the cattle have been yearning for the whole winter long. But the animals take no notice of the plant, because though its leaves look so tempting, the lesser celandine is poisonous. It's better not to eat it, if you care for your health.

There are many poisonous plants in the meadows and in the woods: the greater celandine, the thorn-apple, the hemlock and others.

Since time out of mind, the Russian peasants have brought the crimson fly-agaric from the woods, cut it up into small pieces, put it on a plate, poured sour cream or milk over it and used it for trapping flies. The flies were immediately attracted by the cream and milk and, before they knew it, they were dead.

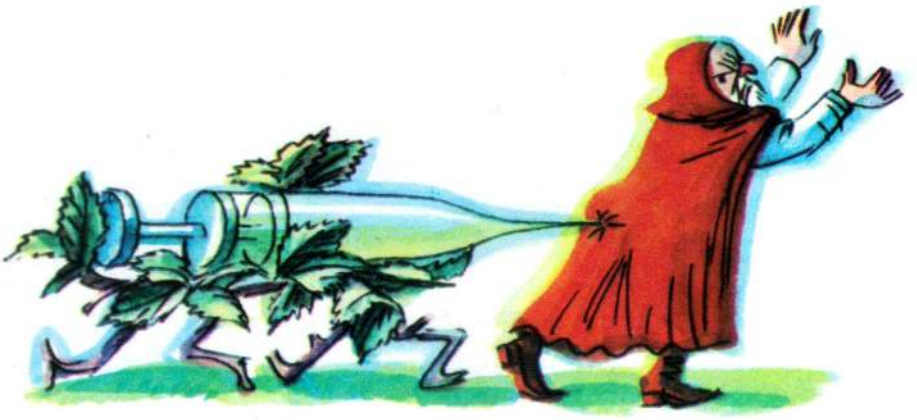
Killing flies, however, is not the main objective of the fly-agaric. Though they are a nuisance, flies do it no harm. Worms, snails and slugs are a different matter and it is against these pests that the fly-agaric mainly uses its poison.

Not all poisonous plants are equally harmful for all animals. No domestic animal will touch the hellebore, while sheep are quite fond of the common marsh marigold. On the other hand, its bright yellow colour has the same effect on cows and horses as the sign "Stop! Danger!" on an electric pylon has on a man.

Oleander, the evergreen shrub, is to be found in parks on the Black Sea coast of the Soviet Union. It is sometimes grown in pots as a decorative indoor plant. You will notice that there are practically no flies in a room where there is an oleander shrub. Even if some unsuspecting fly does fly in the window, it won't live long. Once it alights on an oleander leaf, it is finished.

The same may happen to a thoughtless kid if it eats an oleander leaf by mistake. But grown animals seldom make such a mistake. In the space of the millennia that they have known the shrub, they have learned to recognise it by its smell, its flowers and other features.

Men are more liable to make the fatal mistake, and then they pay dearly for it as did the French who invaded Spain early in the last century. There was not a single man among the soldiers who knew that the shrub was poisonous. The soldiers had whittled oleander branches for spits on which they roasted the meat. The poisonous sap spread through the meat and killed them.



THE STINGING NETTLE

When the American botanist David G. Fairchild was a little boy he asked his parents countless questions as all children do. Seeing a bird in flight he would ask why men had not learned to fly too. Walking up to a tall pine-tree he would want to know if he would grow as tall if he ate well.

Once David got stung by some nettles and asked his father:

"Why does it sting so?"

"The stinging nettle is a crosspatch. It doesn't like to be touched," answered his father.

As David grew up he became interested in plants and once he was a botanist, he could give a more detailed answer to the question he had asked as a child. He would have said: "The nettle stings because it has little stinging hairs that look like tiny bottles. The hairs are very brittle and break at the lightest touch. The ragged edges sink into a man's skin like syringes. These "syringes" contain a substance that burns, making the skin itch for a long time. Next time, you may be sure the man will walk round the "crosspatch".

Plants that can stick up for themselves have fewer enemies. The nettle, for instance, has only two: the caterpillar of the nettle butterfly and the peacock butterfly. Imagine, only two enemies out of the thousands of species of living beings! And even these two caterpillars don't do the nettle much harm.

The nettle defends itself so well that other plants follow its example. There is the deadnettle whose leaves are exactly like those of the nettle, only they don't sting, they don't have the stinging hairs.

The deadnettle is a cheat, it's not a nettle at all. It's not even related to it. The plant disguised itself as a nettle on purpose, so that it should be taken for one. Men and animals usually take it for the stinging nettle and leave it alone.

The leaves of the yellow deadnettle and the nettle-leafed bell-flower look very much like those of the stinging nettle and they, too, grow unmolested.

Even as a botanist, Fairchild never ceased to wonder at the ingenuity of the stinging nettle, but when he went to the Philippine Islands he saw a

more extraordinary nettle. It was not a grass but a tree called laportea. The tree was exceptionally beautiful with its bright green leaves and blue fruit. Without a thought Fairchild went up to it.

"Be careful!" warned the Filipino who accompanied him. "Don't touch the leaves!"

"Why such precautions?" asked Fairchild. "Evidently, the Filipino thinks I don't know the stinging nettle. It'll itch an hour or two, so what?" With that he touched the foliage with his index finger.

Immediately a terrible pain went through his hand and Fairchild almost cried out. The Filipino hurried up to him and led him away from the tree.

The pain in his finger troubled him for several days but gradually died away. Yet the tip of the finger had grown numb and remained so for a long time.

Since then, Fairchild never went up to a laportea. When he had to photograph the tree he did it with so much precaution you would think there was a rattlesnake swaying in front of him.

After he returned from the Philippines, the botanist never passed an opportunity of learning something new about nettle trees.

"In Australia," a botanist friend told him, "I was reckless enough to touch the leaf of nettle tree. My finger ached for a long time. I could feel the burn even several months later."

"There is a dangerous nettle in the jungles of Indonesia," another botanist told him. "Its sting has the same effect as a snake-bite and causes convulsions and even death sometimes. If the man is lucky enough to survive, he will feel the sting all his life and in damp weather the pain becomes unbearable."

After he heard these stories, Fairchild changed his opinion of the laportea. Every time he recalled his visit to the Philippines, he said he had been very lucky. After all, he could have come across a far more dangerous nettle.

A MARKING FOR LIFE

Many of the Londoners who came to Hyde Park that day witnessed a curious spectacle. Armed with long gardening scissors the gardeners were trimming some tall plants. When the branches they cut off fell to the ground, the men jumped aside with remarkable alacrity. It looked very funny and the Londoners chuckled to themselves.

But it wasn't a bit funny to the gardeners, they were anxious to get out of the way of the falling branches in time. After all, they were trimming the cowparsnip, and that's a plant you cannot treat lightly.

People did not immediately notice that the cowparsnip was dangerous. At first, the bizarre plant was grown in the famous Kew Gardens. From there it was transplanted to the lawns of London parks and, as a result, many people suffered from burns.

The cowparsnip was brought to Britain from the Black Sea coast where the people are very well familiar with its "bad temper" and try to keep away from it. In the summertime, many holiday-makers come to the Black Sea beaches. They have no idea that they will be punished if they touch the large leaves of the cowparsnip. They will not feel the burn right away, but after a time they will start itching. For several days they will walk about with bandages on their hands and legs and when these are removed several days later, there will be scars, markings that will remain for life.

It was not so long ago that some varieties of cowparsnip were discovered to emit volatile oils that burn.

About ten years ago, a curious thing happened in the botanical gardens of the Moscow Chemical and Pharmaceutical Institute.

A group of workers in light summer dresses were weeding the flowerbeds. One of them broke some large leaves off a grassy plant growing nearby to protect her neck and shoulders from the hot rays of the sun. The others followed her example. In the evening, they were all suffering from severe burns. And the strange thing was that it was the spots that had been covered with the leaves that had the worst burns.

The women were puzzled: "Funny! We tried to cover ourselves to keep out the sun and we got sunburnt all the same!" they wondered.

That is how the cowparsnip punished people who molest it.

Today, everyone in the botanical gardens is more careful; they put on gloves when they approach the plant and, of course, they never apply the leaves to their skin any more.

Herbivorous animals discovered the harmful qualities of the cowparsnip long before men and never touch it. The plant had taught them "good manners" in the thousands of years they have associated.

INVISIBLE GUARDS

The bazaar in Tashkent, the capital of the Uzbek Republic in Soviet Central Asia, is noisy and colourful. There is no end of the things you can buy there, from melons and bunches of grapes filled with golden juice to the gaily striped national gowns and embroidered *tyubeteikas* (skull caps worn in Central Asia). The whole bazaar is pervaded with the delicious fragrance of spices that make your mouth water.

About fifty years ago Boris Petrovich Tokin, a young scientist from Moscow, found himself at an Oriental bazaar for the first time and was eager to see everything. But a local friend was stubbornly steering him in one definite direction.

They made their way along the line of stalls and finally found themselves in a place where there were even more people. The round-faced Uzbek did not waste time praising his wares, he had enough customers as it was. He had his hands full putting meat filling on a pancake, folding it and putting it on a hot griddle. "You won't find such meat pies anywhere else," Tokin's friend told him.

Boris Petrovich burned his mouth the instant he took a small bite. The filling was seasoned with such sharp spices that it seemed to him his mouth would burn the whole day.

"What does he put into them?" asked Tokin catching his breath.

"Garlic, pepper and some herbs," answered his companion.

At these words Tokin forgot about the pies and about his friend and was lost in thoughts that had not given him peace for quite some time.

It had all started with an experiment. Once Tokin had grated an onion and placed the strong-smelling pap next to some yeast fungi under a glass cover. In 24 hours the fungi were dead.

"That means the odorous substances emitted by onions kill fungi at a distance!" he exclaimed. The idea surprised Tokin and made him continue his research.

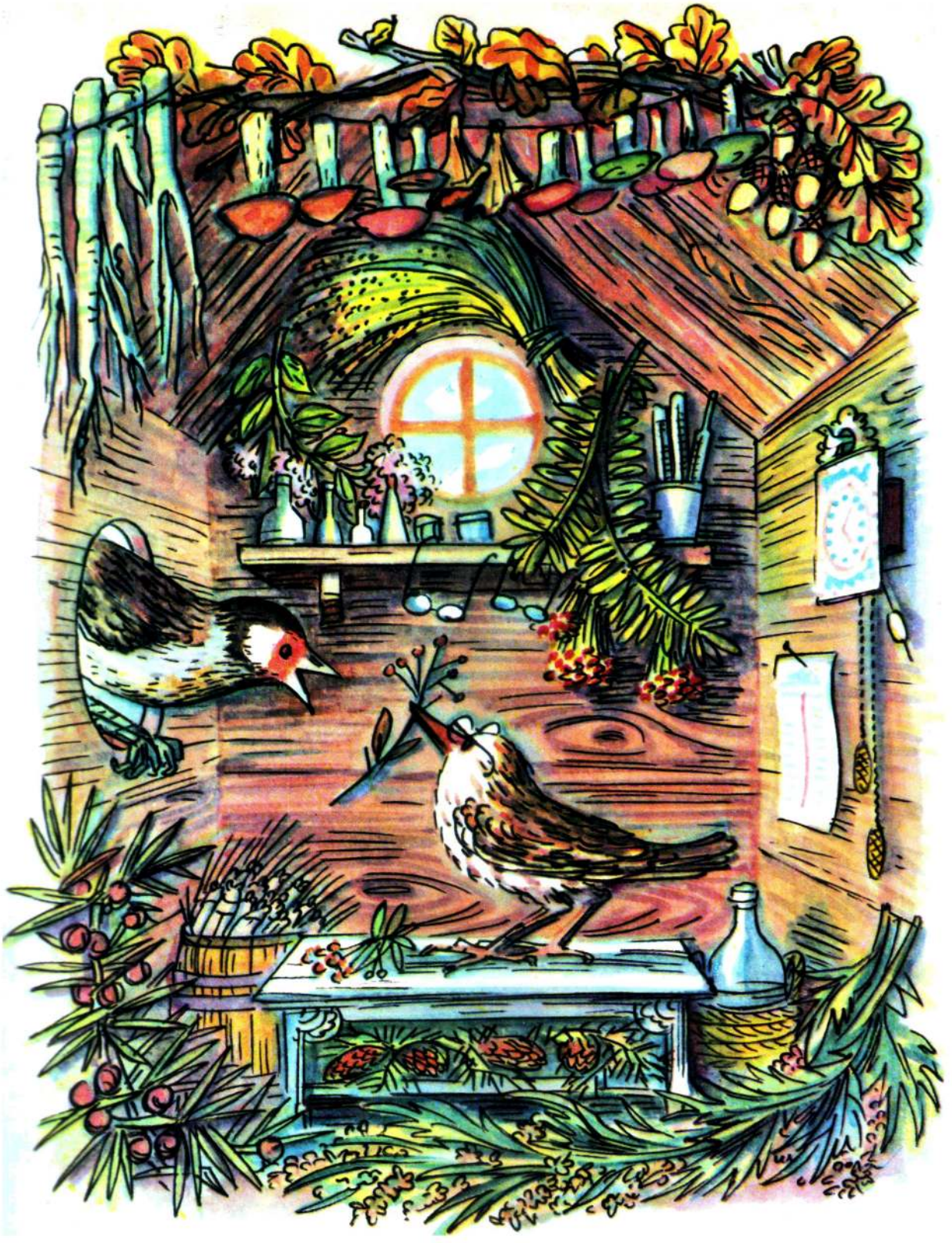
He made hundreds of experiments. Instead of onion he used grated garlic, finely chopped leaves of the bird-cherry tree, mustard powder and ground pepper, and instead of the yeast fungi, mould fungi and various bacteria that caused disease. The result was the same, the odorous substances of the plants killed the fungi and bacteria. Tokin called the substances phytoncides, from the Greek word "phyton" meaning "plant", and the Latin "cidere" meaning "to kill".

In 1941, when Hitler's armies attacked the Soviet Union, physicians searched for a remedy that would help the wounded soldiers to recover as quickly as possible. At one hospital they remembered about Tokin's experiments, and decided to try them out. So they grated an onion and held the mash close to a wound for ten minutes. After that they took a sample and discovered there were practically no purulent microbes left in the wound. They tried the same thing with another wounded man and again the experiment was a success. Festering wounds healed after being treated with onion several times.

During the war, Professor Tokin continued to experiment trying to discover new plants rich in phytoncides. His discoveries proved that trees. shrubs and grasses had an invisible but powerful weapon that neither humans nor animals possessed, and therefore, they suffered less from harmful bacteria.

Not only bulbs and leaves, but flowers, seeds and roots emit phytoncides. In the air and under the ground—everywhere the volatile substances fight for the life of the plant. Even undamaged blades of grass have a destructive effect on microbes, while damaged grass blades create a real "gas screen" around the damage area.

The phytoncides are the first line of defence. They take on the initial assault of the bacteria at a distance, halt their progress and destroy many of them, enabling the plant to make short work of the enemy.



In the old days, it was the custom in Russian villages to rub the floor with juniper branches when anyone fell ill. The phytoncides thus released helped the people fight disease, though they did not suspect it. Today, we know that juniper is a record-breaker among plants for the quantity of phytoncides. People breathe easier in juniper groves because, in protecting itself, the shrub clears the air of harmful microbes.

The curious thing is that man was not the first to discover nature's odorous "medicine-chest". It was the birds that did it. The helpless nestlings cannot preen their feathers and are easy prey for mites. Fragrant herbs are the thing that helps them. Wormwood is the best "insecticide" for birds. From the great big eagles to the little sparrows—all the birds bring little branches of wormwood into their nests. The speckled magpies even make their nests out of it. The starlings disinfect their nests either with wormwood or peppermint. If these herbs don't happen to grow nearby, the birds start stealing onion and garlic from the nearest kitchen-gardens.

CHRIST'S THORN

Once, about twenty years ago, I went on an excursion to the Northern Caucasus with a group of hikers. We were labouring up a winding path with heavy rucksacks on our backs trying to reach the camping ground before sundown. There were mountains as far as the eye could see, then rounding a turn in the path we came upon a watch-tower blackened with time. It stood solitary like a stern guard.

My shoelace got torn just that instant and I bent down to tie it together. When I gave it a pull, it tore in another place. While I was fussing with it, the group walked far ahead.

So I decided to take a short-cut and walk straight through the thicket on the rocky slope.

The shrubs turned out to be terribly prehensile, the branches clutched at me like claws. Every step was an effort and I had a hard time getting out of the thicket. My jacket and trousers were all torn and my face and hands burned from the scratches.

When I caught up with the group, my companions exclaimed with surprise:

"Did you get into a fight with someone?"

"No, I didn't. I tried walking through some shrubs."

"Oh, it's the clutching-tree!" said our guide Chermen with a smile.

"What did you say it was?" I asked to make sure.

"The clutching-tree, I said. That's what we call Christ's thorn here. You shouldn't quarrel with it. You want to walk through it, but it doesn't let you. It's terribly pugnacious. That's why we called it the clutching-tree."

The next day, when the scratches no longer hurt, I asked Chermen to show me the shrub. I wanted to take a good look at my recent "enemy".

The shrub was very branchy and had thick egg-shaped leaves. Every leaf was protected by two thorns. "Just like soldiers with bayonets at the ready," I thought. "You touch them and they immediately repulse you."

I touched one of the thorns—it was very sharp. I wanted to break one off as a keepsake but my fingers still ached from the day before, so I changed my mind and stepped away from the shrub.

I never came across Christ's thorn in the central part of Russia. It grows in the south of the USSR, in the Caucasus and the Crimea. Still, thorny plants are not a rarity in other places. We see them all the time, in the woods, in the fields and even near our homes. They are all remarkable "armourers" for they have created so many types of "arms" that you could hold an exhibition. They have swords, spears, pikes and tridents for warding off different enemies.

I don't know of anyone who is not fond of raspberries. They taste so good, but it's not easy to pick them. The moment your attention wanders you prick your finger with the tiny "needles" the stems are covered with. If a snail or caterpillar wants to treat itself to the juicy leaves the little needles on the stem are bound to rip their soft bellies.

The hawthorn can fight enemies of greater size than the snail or caterpillar—it has thorns the length of a finger. Such "awls" can drive away any ruminant.

Then take a look at the honeylocust, it has thorns the size of a dagger! The animals really have a hard time with it! But the farmers think it makes an excellent hedge. That is why we started to grow this "scarecrow" tree in the south of the USSR.

The sweetbrier also puts up a good fight. Its shoots bend down to the earth in arcs. The buds produce new shoots and these, too, take the shape of arcs. They intertwine with the straight branches in such a way that it's hard to say where they begin or where they end, moreover, the trespasser finds sharp thorns sticking out in all directions. Could it be the sweetbrier that gave sappers the idea of making barbed wire obstacles? Or was it its noble relation, the rose?

Since time immemorial, the rose has made men wonder not only at the beauty of its flowers, but the sharpness of its thorns as well. These were even said to have magic properties. The soldiers of the Roman Empire, where the rose was honoured as the symbol of beauty and inaccessibility, used to put wreaths of roses on their heads before battle. They believed that the prickly beauty would help them overcome the enemy.

How did the plants come by their weapons? After all, they had to be made of something.

People in ancient times used to make spears and daggers out of sharp stones, then they learned to make them out of bronze and iron. What about plants?

Each one of them defended itself in its own way.

The thistle started to elongate the veins of its leaves. They stretched and stretched beyond the limit of the leaf and thus formed a thorn.

Some of the leaves of the barberry changed to such an extent that they could no longer be called leaves, they actually turned into thorns. So, you see, the leaves divided duties: some—the usual ones, that is—continued to procure food out of the air and the sun's rays, while others protected the plant from foes.

As for the sweetbrier, it used some of the "skin" of its branches to shape its weapon. The Christ's thorn changed its stipule situated at the base of the leaf. It was these thorns that had scratched my face and arms when I was hurriedly making my way through the thicket.

HOW PLANTS KEEP THEIR "SAWS" SHARP

In the old days, people had no idea of the fancy set of tools you can buy nowadays. The good old axe did duty for all, the saw included. It was used in building elaborate dwellings as well as for felling trees of all sizes. The axe was a Jack of all trades in those days.

On the other hand, what's so tricky about an ordinary saw? Just a long piece of steel with jags and nothing more. Still, it took men quite some time to invent it, and the first-ever saw was nothing like the one we know today. A jagged fragment of flint was what our remote forebears used to saw with.

Plants acquired saws much earlier than human beings. Of course, their saws are not made of steel but, on the other hand, they don't use them for sawing trees.

In some ponds and lakes you may see a plant with bunches of long leaves. They appear very juicy but you will notice that the fish avoid them. The reason is that the edges of the leaves have sharp jags that cut. If a fish tries to eat a leaf it is sure to cut itself. The plant was given a most appropriate name, that of water soldier.

We are more familiar with the sedge. Many youngsters have suffered from it more than once. You only run your finger along the edge of the leave and it will cut you like a razor. At first glance, the sedge really looks like a razor

blade, but if you look at it through a microscope you will see that it has a notchy edge and it is this "saw" that cuts your skin.

Grown animals know that the sedge is "ferocious" and never eat it. But if some foolish calf or lamb tries to chew it, it will cut its mouth and will never touch it again.

But why do vegetable saws cut so well, you may ask. After all, they're not made of steel. The lime and the birch also have jagged leaves but no matter how much you run your fingers along their edge, you will not cut yourself.

The secret of why the water soldier and the sedge cut is that they absorb a lot of silicon from soil, and that makes the edges of their leaves unusually hard, providing them with a well-sharpened saw.

THE BLACK TEST

The Soviet botanist, Yevgenia Mikhailovna Plachek, was sorting out sunflower achenes which lay on the laboratory table. She was trying to understand what was happening to the plant, why this big, "hefty" flower had become so inadaptable.

The question had long troubled Plachek and she had begun her research when she was still a young woman working at an experimental station. The years were passing and she had not found the answer yet. But she had to find the answer because the fate of thousands of peasants depended on it.

It was not the first year that some small, practically unnoticeable caterpillars were pestering the fields of sunflowers. They gnawed through the achene skins and ate the oily kernels. And the greater the quantity of sunflower sown, the greater the loss.

Plants protect their offspring from insects in different ways.

The seeds of the plum, apricot and peach are concealed in hard stones. The walnut is covered with a thick, hard shell. The buds of the burdock are thickly covered with cobweb so that all insects get entangled in it and perish.

Evidently, the sunflower had been too lazy to invent a method of protection, and so it had to take its punishment.

But in the thick of the stricken fields, agronomists would come across whole plants which the caterpillars had left alone. Was that accidental or not, Plachek wondered?

She decided to examine under the microscope the skin of an undamaged achene and, to her surprise, discovered a coating of black coal dust. It was thin but very strong. The seed hid behind it as though it were a life-saving shield.

It was a pity but the protected achenes were all small while all the large ones were damaged by the pests.

"Now that's strange!" wondered Yevgenia Plachek.

That riddle, too, was finally solved. The plants with the small achene differed little from the uncultivated sunflower, while the farmers wanted to grow varieties that would give a high yield. Therefore, they started to pick the largest achene for seeds. They miscalculated when they failed to see that the plant had lost its protective "armour".

Plachek resolved to return the sunflower its protective coating. That took almost 10 years to achieve. There were countless experiments and failures. The botanist worked indefatigably. She was so eager to help the farmers.

The long-awaited day finally arrived. Yevgenia Mikhailovna Plachek created a new high-yield sunflower which was no longer afraid of caterpillars.

A LIFE-SAVING BANDAGE

The Italian city of Venice is a real wonder. It has canals instead of streets and boats instead of automobiles. There are more bridges there than there are footpaths in some cities. Its marble palaces that admire their reflections in the water are so magnificent that they attract tourists from all over the world.

The Venetians have paid a high price for the beauty of their city built on several small islands. The proximity of water is ruinous to the buildings. The wet sand is as fluid as soft jelly. You build a house and it sinks in a little while. In order to reinforce the ground the Venetians had rammed in 400,000 wooden piles into it so it would make a solid foundation for the majestic city.

But it is a well-known fact that wood rots in the ground. However, the city of Venice has been standing on its wooden piles for more than 1000 years.

How is it that the Venetian piles are so strong?

The trunks and branches of the trees are covered with bark. It is like skin on the human being. As long as the bark is whole, the trunk is safe, but once the bark is damaged it lets through the spores of harmful fungi through the wound. Or it is beset with bacterial rot which eventually turns

the wood to dust. Of course, it is bad when the bark is injured, but that does not mean that the "wounded" wood will inevitably rot. Much depends on the species of the wood and its ability to protect itself.

When the bark of a coniferous tree is injured, it starts to secrete resin which consists of turpentine and colophony. The acid turpentine kills "enemies" while the sticky colophony puts a healing "bandage" on the wound.

The powder-post beetle causes the forests a lot of damage, but the resin saves the coniferous trees from the pests. Even if a beetle manages to drill a hole in the tree-trunk, the resin will get him even there and immure him. That is why, beetles avoid healthy trees that have plenty of resin. The smell of the turpentine acts on them the same way as a red traffic-light on people.

All trees of the coniferous family possess resin, but the larch is especially rich in it. The abundance of resin makes it remarkable strong. That is why it may be preserved for centuries in wet ground and water.

If you go to the Hermitage Museum in Leningrad, you will see the wheels of an ancient carriage made out of the roots of the larch. They had lain in the ground for more than 25,000 years and did not rot.

The builders of Venice were evidently familiar with the properties of different species of trees, therefore they chose the larch for the piles on which the city was to stand. Though in Italy the larch grows only in the mountains far from Venice, the citizens did not stint the money for it. They had thousands of trunks of larches brought and rammed into the ground as foundations for their homes.

A thousand years passed since then, and suddenly the citizens began to wonder: "What if the piles have started to rot?" So they took up picks and spades and dug up several piles and examined them closely. There was not a sign of rot! Then they struck the wood with an axe and the blow left no trace on! The piles had grown even stronger by being in the water for so long. Even an axe could not chop them.

OAKEN FOOTWEAR

"They've found an old ship!" The news spread like wildfire among the neighbouring villages.

The "ship" turned out to be no more than a large boat. Its time-blackened prow stuck out of a hole that the workers had dug.

The fragment of the dug-out was sent to a laboratory. There they said that the vessel had been built about 3,000 years ago!

The ancient craft had been dug out of the trunk of an oak and it had lain in just as wet a ground as the larch piles of Venice, with the only difference that it had lain in the ground almost three times as long. What had preserved the dug-out from rotting? Everybody knows that the oak has no resin.

Since time immemorial people have tried to preserve things from spoiling. The tanners had also tried to do the same. What was the use of a pair of boots that start to rot or get all warped after you wear them out in the rain? But that is exactly what happens with badly dressed leather.

For centuries the tanners learned the secrets of dressing skins, that made their knowledge and skill all the more useful.

As early as the 9th century A.D., ancient Kiev was famed for its leathers. Morocco—brightly-coloured lambskin—and Russia leather—dressed cowhide and elk-skin—was taken from Kiev to all parts of Russia and to foreign lands as well.

Elegant boots for festive occasions were made of Morocco leather, while

Russia leather was valued for its durability and used to make travelling shoes, saddles, straps and belts. Things made of Russia leather could withstand the winter frosts, the springtime mud and slush, and did not warp or rot.

Russian tanners of old often visited the woods and observed the different plants closely. They noticed that not all the trees withstood

decay in the same measure. The aspen was often affected by a fungus which ate its core. A tree that looked quite healthy would break when a strong wind started to blow.

The willow, on the other hand, did not rot for a long time after it was cut down. So the tanners of long, long ago decided that the willow could pass on its resistance to decay to the skins. They began to soak the skins of animals together with willow branches. You could walk through puddles in boots made of such leather and they did not grow mouldy, or crack or get warped.

It was to the willow that Russia leather owed its popularity.

The peasants also used the alder for dressing hides. The fishermen valued the tree, too. After boiling alder bark they would soak their fishing-nets in the infusion and that prevented the nets from rotting.

The oak had also been the tanners' good friend since time immemorial. It is also saturated with substances that combat rot. But for a long time people did not know what kind of substances these were. When they discovered them they called them tanins. They protect the tree from harmful insects, fungi, rots, and different bacteria. The oak does not have resin like coniferous trees, but it has to protect itself somehow. That's when the tanins come in handy. Thanks to these substances, the oak preserves its durability even in the water. It only turns black and grows harder with age. That is why the ancient dug-out found on the bank of the Medveditsa river in the USSR was preserved to our times.

Many years have gone by since man learned about the useful properties of the oak and it seemed the tree held no more secrets. But recently scientists have discovered that the oak can be useful not only to tanners.

Oakwood infusion was added to concrete giving it remarkable resistance to moisture and acid substances. The concrete reinforced in this way is used for the building of dams and chemical works. Today, the oak "juice" produced at chemical enterprises in the USSR is used in manufacturing more than a hundred different items.

ANOTHER FELLOW'S SECRET

Lyonya and his best friend Petya lay in the long grass and watched Grandfather Yegor. The old man did not see them and walked about the garden dipping a brush into a pail of tar and coating the trunks of apple trees with the sticky stuff.

"He's doing that because of us," whispered Lyonya. "So that we won't climb up the trees to steal the apples."

"What a mean old man!" said Petya crossly. "Afraid we'll take a few of his apples. As though we ever take much."

Very soon, all the kids in the village knew that Grandfather Yegor was a miser. Only Vitya, his grandson, did not know about it. When he found out, he got very angry:

"Why do you talk of things you don't know? My Grandfather is protecting the apple trees from caterpillars, and you say he's a miser!"

"My, but your Grandfather is a cunning fellow," said the boys astonished.

But Grandfather Yegor was not cunning in the least. He simply took advantage of another's secret—something that even the inquisitive Vitya did not know.

In the meadows or in the fields you may come across a small plant which has flowers with five petals. It is called campion or stickseed. When

a beetle, an ant or some other insect fond of a free treat tries to reach the sweet nectar, it finds its way to the flowers blocked by a sticky stripe on the stem. After all, the flowers' nectar is not meant for these insects but for the night moth that pollinates them, the nectar is the reward for their pains. The sticky matter on the stem of the flower is no obstacle to the butterfly because it alights on top of the flower.

If an unwanted guest turns out to be stubborn and continues his journey up the stem of the campion it will get stuck in the mess and struggle till he dies.

The catch-fly and the meadow geranium protect themselves in the same way. These plants have another peculiarity: they produce the sticky substance very economically. They cover only the upper part of their stems, the parts closest to the flowers, with the sticky substance. The campion, too, does not cover its entire stem but only has rings of the sticky stuff on its stalk. Besides, it does not secrete the stuff all the time. It needs the protective "glue" only during blossom time, to protect the nectar. When the flowers fade and there is no more nectar, it stops producing the sticky substance. Why waste effort if it can do without it?

Resourceful gardeners borrowed from these plants their method of protecting themselves from harmful insects and started to paint the trunks of fruit-trees with tar. What's more, they don't paint the entire trunk: just one ring—the first danger zone—then another, leaving some space in between. They learned to economise from the campion.

A LIVING STONE

Will Monsell walked slowly in the hot noonday heat over the stoney plain. It was not so much the heat that was wearing him out but his forced idleness. The business for the sake of which he had come to South Africa wasn't making any progress.

For a whole month he had been going on "botanical" walks every morning but with no results. Thinking of his bad luck he stumbled on a stone. To his surprise, his toe did not hurt. It seemed that he had hit a soft pumpkin instead of a piece of granite. Will bent down and started to examine the strange stone. A piece had broken off the place where Will had hit it and to the great surprise of the scientist, a liquid seeped out.

Then it dawned on Will that the strange stone was actually a plant!

People have grown used to animals camouflaging themselves for protection. The lion's coat, for instance, is the colour of the sands of the savanna. That enables the King of Beasts to creep up to his prey unnoticed. The tiger's stripes help it to hide out in the bamboo groves. The hare's coat is gray in the summer and snow-white in the winter.

Attentive people have noticed that plants, too, use camouflage. Some edible mushrooms try to look like their poisonous counterparts.

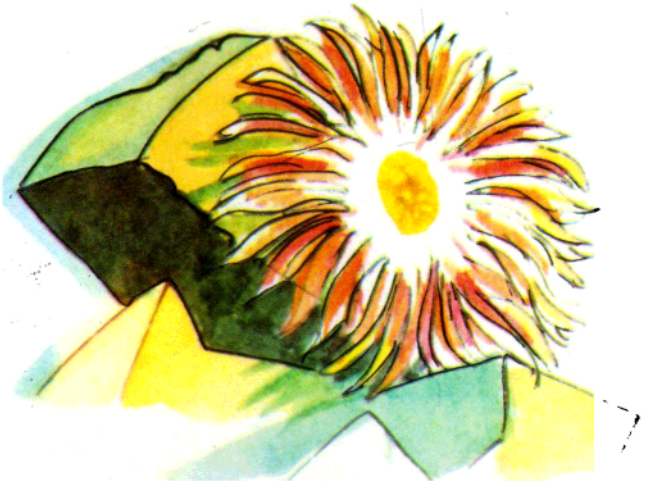
An annulated boletus often looks like the inedible pepper mushroom, and you can easily confuse the golden-brown mushroom with the poi-

sonous pseudo'golden-brown mushroom in the late autumn. The delicious edible boletus can hardly be distinguished from the bitter one.

Camouflage in the mushroom kingdom was well known to the scientist and, therefore, did not surprise him in the least, because we all get used to familiar things. But what he saw in Africa was unlike anything he had ever seen before. Will was quite bewildered: he had the good fortune of discovering quite a new form of plant camouflage!

The botanist visited the place every morning, but the "stone" did not change. The rains started soon after and the scientist was forced to stay indoors. When he returned to the place where he had found the stone, after the rains were over, he could not recognise his old friend. A lovely pink flower that looked like an aster was blooming on it. All the "stones" near it were also in full bloom!

The whole thing was so unexpected that Will could not understand for a long time why such a secretive plant should betray itself all of a sudden. At last, he guessed the reason: the camouflage saved the plant from herbivorous animals in the most difficult, dry season of the year. Most of the grass is scorched at that time and the animals are ready to eat anything at all. When the rainy season comes and the desert is covered for a short while with juicy green grass, the pleiospilos or the "living granite", as it is called, throws off its disguise. But when the heat comes, it turns into "stone" again. It's safer that way!



THE ANT TREE

Fritz Müller was born and educated in Germany and, in time, became a prominent naturalist. He took an active part in the 1848 revolution. The revolution was crushed and Müller had to leave his native land. That is how he found himself in another part of the world, in faraway Brazil.

Everything in the new country was unfamiliar and interesting. The naturalist was especially drawn to the Brazilian jungles where there was a large number of curious beasts and plants.

The local population told Müller a lot of strange stories about a tree called the imbauba. He believed and disbelieved these stories at the same time, after all, people are inclined to tell all kinds of fantastic tales. But his curiosity got the upper hand and he asked an Indian hunter he knew to show him the mysterious tree.

For a long time they walked along a footpath that was often lost in the jungle thicket. At last the green corridor opened wide and the two men found themselves in a clearing, in the bright light of the sun.

"There is the imbauba," whispered Müller's companion and, for some reason, stepped back a few paces.

Müller examined the tree with its sparse crown of palmated leaves. There was nothing mysterious about the tree's appearance. It seemed to him he had seen trees like it elsewhere.

Müller walked up closer and took a good look at its smooth trunk. Then he tapped it lightly with his palm. The tree answered with a soft sound as if it were empty inside. Müller wanted to ask the hunter what was so remarkable about the tree but he had no time. Some ants appeared on the trunk and their number grew with every second. A whole army of the insects ran down the trunk.

Müller sprang back from the tree, but it was too late, a number of ants had already got under his shirt. His whole body itched unbearably from their bites.

The hunter came to his rescue, helping him to get rid of the infuriated insects.

"Didn't I tell you," he sighed, "but you wouldn't listen..."

Since then Müller came to visit the imbauba quite often. His observations proved that the tales of the local population were quite correct.

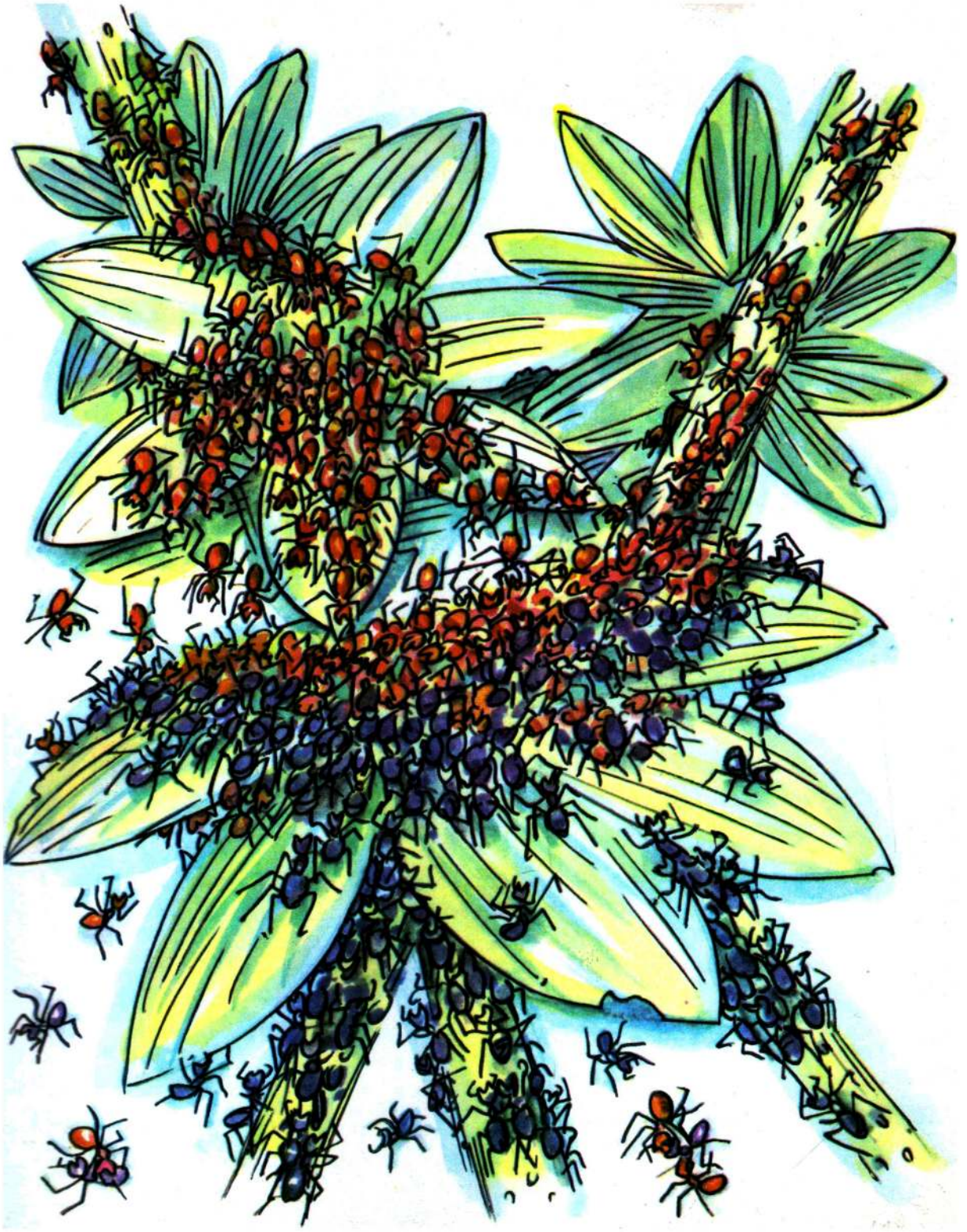
The tree was, indeed, inhabited by warlike ants who were locally called the Aztecs.

The imbauba gives the ants shelter within its trunk which is hollow like the bamboo's. Besides, it feeds the insects so they won't leave it for some other shelter. The food is stored in tasty little balls at the foundation of the leaves. The store is never exhausted so the ants have full room and board within the imbauba.

There came a day when Müller discovered why the tree wanted to have "tenants". One evening, when the naturalist was about to go home, some leaf-cutting ants appeared in the clearing. These ants are notorious in South America. They climb up a tree and cut off all its foliage with their scissor-like jaws. In a few hours the tree stands completely bare.

This time, the bandits had picked the imbauba for their victim. But they had no luck. Hardly had the first detachment of the leaf-cutters climbed the tree when the Aztecs raised the alarm. Immediately, the enraged tenants of the tree poured out of every crack in the trunk. The leaf-cutters were taken by surprise. In a minute the Aztecs had put them to flight, pursuing and biting those who lagged behind.

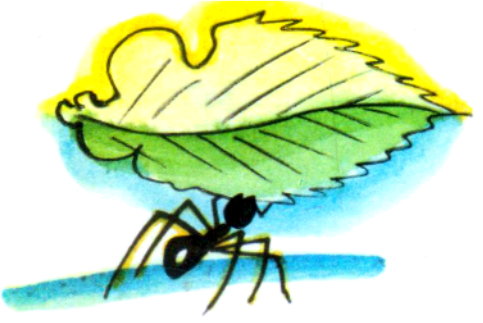
That is the kind of faithful protectors that the imbauba, or trumpet-wood tree, got in return for its hospitality. For a time, the imbauba was believed to be the only tree of its kind in the world. In time, however, botanists learned that "ant trees" were no rarity. They were found in different parts of the world: in America, Africa, India, Malaya, Australia, and New Guinea.



Some trees offer the ants shelter in their trunks, while others provide fanciful nests. The food that the trees supply the ants differs as well. The relations between the "landlord" and the "tenant" are the same everywhere, however.

The tree provides for the insects while these serve their benefactor as faithful guards.

We have no trees of that type in the Soviet Union, but if we look attentively at the ordinary plants that grow in our country—the aspen, the plum, the bird-cherry, the elder, the guelder rose and the bush vetch—we will see that they are friendly with these insects. They do not offer the ants any shelter, it is true, but they are always generous with food. They feed them with a sweet liquid secreted by their nectaries at the foundations of their leaves. The beautiful peonies also treat their friends, the ants, to a delicious juice. Ants are constant visitors with these plants and involuntarily protect their hospitable "hosts" from harmful caterpillars and other unwelcome guests. One good turn deserves another.



CLOTHING FOR ALL TASTES

There were multi-coloured flags fluttering over the port and sounds of an orchestra playing. People from all parts of Norway had come to wish bon voyage to their compatriot, the polar explorer, Fridtjof Nansen. That time he was setting out on his most dangerous voyage—an expedition to the North Pole.

Hardly had the excitement of the leaving-taking died down when an alarming telegram came that said that Nansen's ship the *Fram* had been caught between the ice-floes.

Days passed and there was no hope of reaching the North Pole. For three years the *Fram* drifted in the grip of powerful hummocks. The icy breath of the North burnt the men's faces. The temperature was down to −50° C. But the men forgot their hardships to some extent when they returned to their cabins where it was always warm, though the stokers had to be very sparing with the coal. It was Nansen's foresight they had to thank.

Since time out of mind, people had learned the use of tree bark. Birch bark was used to make baskets for berries and mushrooms that people gathered in the woods. Lime bast was used by the Russian peasants to make *lapti* (footwear worn in the old times in the countryside). Toys were cut out of pine bark.

We are used to the trees that grow in the land we live in, but travellers who have been to other countries tell of extraordinary trees. Not only do those trees have different leaves and fruit, but a different bark as well.

In the swampy jungles of South America where the Amazon flows, there grow trees with a remarkably thin bark. That is natural, since in the humid tropics there is not much difference between the winter, spring or autumn. It is summer the year round. The air is hot and moist like in a steam bath.

Since there is neither cold nor drought, the plants don't have to take the trouble of growing a warm "coat".

But trees in the northern latitudes simply cannot do without a thick bark. Otherwise they won't survive the severe winter. Father Frost is not to be taken lightly, he can freeze anything to death.

The bark is an excellent coat which covers the nakedness of trees. It has small cavities filled with air and it is common knowledge that air does not let in either heat or cold. That keeps the tree cool in the hot sunshine and warm in the winter frosts. Moreover, the bark does not let through either moisture, dust, or harmful gases or spores of fungi.

In the northern regions trees do not stint on clothes. The larch's "coat", for instance, is one-fourth the thickness of its trunk. That is, probably, the reason why it is the most widespread tree in Siberia with its rigorous climate.

The Siberian cedar pine also stands the frost very well. It has delicious little nuts, more than that, people have learned to make panels out of thick-bark for cold-proofing their houses.

Of all the trees growing on Soviet territory, the Amur cork, which is to be found in the forests of the Soviet Far East, has the warmest "clothes". Its soft bark, so velvety to the touch, is almost as thick as a cushion.

In the mountains of Spain, Italy and on the island of Corsica, there grows a cork-oak which breaks all records for thickness. The quality of its cork surpasses that of all the other trees. It is "undressed" every ten years, its cork is pealed off its trunk like a coat. But even after such a radical operation, the woodland giant survives. It grows another coat of cork in time.

In planning his voyage to the North Pole, Fridtjof Nansen decided to make use of the bark of the cork-oak. In order to make the cabins on the *Fram* as warm as possible, he had them lined with cork. That protected

the living quarters from the cold air outside. Of course, that was additional expense because cork is a valuable material, on the other hand, the crew of the *Fram* suffered less from the cold.

In recent years chemists have created a lot of new materials, however, the bark of the cork-oak and the Amur cork is still highly valued in different industries. It is used to make life-belts, life-buoys and corks for bottles, and insulating plates for refrigerators and aircraft.

HOW THE TREES PREPARE FOR THE WINTER

It was a lovely autumn day when the leaves flamed red and birds circled in the clear blue sky. Then suddenly heavy clouds began to gather and in the evening it started to snow. It snowed the whole night. When the villagers woke up the next morning, they could not recognise the wood nearby. The branches and tops of the trunks of most of the trees were broken.

"A hurricane must have gone through it in the night," they decided. But there had been no hurricane.

What was it then that had broken the trees?

Every plant protects itself from the frost in its own way. Many herbs hide underground for the winter. They part easily with their stalks because they know these will grow fast enough when the spring comes. The most important thing is to preserve the "store-house": the bulb, tuber or rhizome, which had accumulated nutritive substances in the course of the summer. In the spring, these substances produce the stalk and the leaves.

It is no accident that the snowdrop, the goose onion, the birthwort and other bulbous and tuberlar plants are the first to wake from their winter sleep.

The "store-houses" are very sensitive to the cold. In the woods where the ground is covered with fallen leaves and freezes only a few centimetres deep, the bulbs are close to the surface, while in the open spaces, they hide much deeper from the frost.

Trees are different from herbs or grasses, they cannot remain without their trunks and must bear all the adversities of the winter standing erect like soldiers. But they have to pay Father Frost a heavy toll for the privilege.

Everyone has seen the wind driving the fallen leaves in late autumn.

Is it the wind that tears the leaves off the trees? Why doesn't it tear them off when they are green?

The question is decided by the little "gnomes", the little root hairs. Day and night, like little pumps, they suck up moisture from the soil that is rich in nutritive substances. The food is "eaten" by the tree, while the surplus is secreted through little vents in the leaves. They, too, have a lot of work to do: a grown birch evaporates up to 70 buckets of water in 24 hours!

In late autumn the ground grows very cold and the root hairs go out of order, they can function well only in warm weather. The leaves, however, continue to evaporate their moisture. Over-expenditure of moisture may dry up the tree, so now the leaves only do it harm and the tree starts to get rid of them.

But shedding leaves is not as simple as taking off one's hat. They will not fall by themselves even in a strong wind. So the trees make thorough preparations for leaf-shedding time.

With the arrival of cold weather, the divider cells appear in the peduncle to which the leaves are attached. They grow across the peduncle and tear the old tissues that join them to the branch. After that the lightest breeze is sufficient to tear the leaf off the tree.

After the leaf falls there is a little scar, the trace of the dividing layer, where the leaf had only recently been attached. It may let out precious moisture or let in the spores of harmful fungi. In order to prevent that from happening, the tree covers the scar with a protective cork layer.

Important changes take place in all parts of a tree that is preparing for the cold winter time. Its tissues accumulate their fill of oil and saccharine substances. The bear makes similar preparations before he starts to hybernate. The juice congeals in the cells, otherwise they would burst in the frost like bottles of water.

For extra strength, the tree develops additional protective tissues and takes care of a dozen and one other things. Only then is a tree prepared to withstand the winter frost.

If the trees do not shed their leaves before the winter starts, they will not only dry up, they will be broken by the weight of the snow that will accumulate on their tops.

Snowflakes are very light when there is a small quantity of them. But a million snowflakes make a weighty burden capable of breaking a tree trunk.

That is precisely what happens when the snow falls too early. Fortunately, such whims of the weather occur very rarely, and trees have grown very sensitive to the changes and learned to cast off their leaves in good time.

THE LOST WOOD

Two men walked along the swampy plain of the tundra. They had come a long way from the polar station lost in the vast expanses of the Chukotka Peninsula, in the extreme north of the USSR. The tundra lay before them as far as the eye could reach.

The men moved along with difficulty, the shifting soil overgrown with fuzzy moss was unsteady under their feet. They had to be on their guard all the time, one false step and they would sink waist-deep into the swampy mess.

The short autumn day was fast nearing its close and they had to hurry. The men knew that if they didn't manage to reach their destination while it was still daylight, they would have to turn back. Actually, their mission was not a difficult one. They simply had to dig a hole and put up some measuring instruments. The thing was to find a noticeable spot so they wouldn't have to look long for it later on.

On a steep bank of a river the men saw a little cedar wood, sparse and stunted. They were overjoyed at the unexpected sight. Indeed, it would be hard to find a more conspicuous place in the tundra. The rigorous climate of the Chukotka Peninsula, the severe frosts and the ferocious winds make it impossible for the trees to grow any taller.

The polar station workers chose the tallest tree, dug a hole under it and

buried the instruments. Then they tied a red cloth to one of the cedar's branches, just in case. Walking away from the tree they looked back. The cloth flamed red in the sun like a red lamp.

"Quite a reliable landmark," said one with a smile.

"Yes," agreed the second, "quite."

They returned to the spot in the winter when the tundra was covered with snow. They skied about the familiar steep bank but found no trace of either the wood or their red cloth. They had simply disappeared!

They couldn't believe their eyes and took out a map of the area to check. Everything was correct, they were standing in the same spot where they had been in the autumn. They exchanged puzzled glances and turned back.

The winter blizzards howled long and loud and spring arrived only in June. The snow had almost melted and the herbs began to flower.

Once again the two men set out in search of the lost instruments. They returned to the spot and found the wood and even the red cloth fluttering in the wind. It seemed to be the same cedar wood and yet it was different somehow. It had been short when they first saw it but now it was even shorter, its branches and trunks were bent low to the ground. Only then did the workers of the polar station realise what had happened to the wood in the winter.

The men were newcomers to the North and the funny episode was the result of their inexperience. The local inhabitants are not surprised by the "disappearance" of woods in the tundra, they are used to the tricks of the cedars.

Trying to protect themselves from the cold, the trees press their trunks and branches to the ground, that is why they are called the creeping cedars.

In the summer, the branches rise above the trunks by one-and-a-half or two metres. In the winter, they bend to the earth under the weight of the snow and disappear under it till the following spring.

Since the summer in the North is very short, the creeping cedar is covered with snow the greater part of the year. There it is as warm as in a feather-bed.

Not only the cedar, but other short trees and shrubs that grow in the Far North and high up in the mountains—the alder, the birch, the Pontic oak, the juniper, and the mountain pine—have learned to play "hide-and-seek" with the frost.

The further North you go or the higher up the mountains, the shorter the trees. On the very edge of the tundra you may come across dwarf birches and willows. Their trunks are no taller then a pencil! Such tiny trees have no need to bend or "creep", they'll be covered with snow anyway. In the summer even the mushrooms grow taller than these trees, but they live for a few days only, whereas the dwarf trees, the willows and the birches, live for more than a hundred years.

FLOWERS THAT DISAPPEAR

Masha looked out the window on the familiar lawn and could hardly recognise it. Just the other day it had been bright with golden dandelions. "I wonder what happened to them?" thought the little girl anxiously. "I hope the boys didn't pick them all."

There was no need for Masha to worry, the boys had nothing to do with it. No one had touched the dandelions.

What had happened to them then? They couldn't have disappeared at the wave of a magic wand.

Plants do not have an easy life even if no animal or insect eats their leaves, or the winter cold is over. Not all plants are equally hardy, there are some that feel chilly even on a warm summer night.

The little sorrel grows in fir-groves. This graceful herb is very delicate. Its thin leaves are divided into three lobes. In the night-time each lobe folds double and droops. "The little sorrel has gone to sleep" people say. They are wrong, it has not gone to sleep, it is trying to protect itself from the cold. In cold rainy weather it "goes to sleep," in the same way.

The clover "goes to sleep" too. Only its folded leaves do not droop but rise.

The leaves do not get folded all by themselves. In different types of weather, the pressure of the sap in the cells either rises or falls, and that brings the "turning mechanism" of the leaves into action. It works like the pneumatic piston which opens and closes the doors of buses.

It's a good thing when a plant manages to protect its leaves, but its flowers are even more important. If its pestle and stamens are damaged it will produce no seeds. All its work which has taken so much time and effort will go to waste.

But how is a plant to protect its flowers from the cold? Should it cover it with bark? Fold it in layer upon layer of coating like the onion?

That's too cumbersome, so it's no use.

The plant has a lighter and more delicate way of protection. The flowers of many wood herbs have the shape of bells, jugs, lamp-shades and helmets. The opening through which the pestles and stamens "look out" on the world narrows and the influx of the cool night air diminishes. In this way, the flower makes a tiny little nook where the air is warmer than outside. That is how the flowers of the bluebell, red bilberry, bilberry, lily of the valley and the bearberry protect themselves from the cold.

The poppies and buttercups look like fragile cups. A cup is nothing like a jug or a lamp-shade, it won't hold the warm air. However, we don't see the poppies and buttercups suffering from the cold more than other flowers. How do they manage?

Remember how glossy the petals of these flowers are? They seem to be coated with lacquer. What is more, they are concave. Like a mirror, the glossiness directs the sun's rays towards the centre of the flower where the pestle is, because it needs the most warmth for the pollen on its stigma to germinate.

The mirror-like petals are the plants' assistants. Thanks to them the temperature inside the flower rises noticeably though the flower is cup-shaped.

The small flowers of the arum are covered by a broad leaf like with a coverlet. When it is only 10° C outside, it may be all of 30° C inside the flower!

The lovely white water-lily has its own secret. It basks in the rays of the sun the whole day, but towards the end of the day, when it grows cooler, the plant immediately "switches on" its protective mechanism: its thick sepals begin the close up and cover the snow-white flower and its long and pliant peducle shortens and pulls the flower under the water. It is warmer inside the water in the night-time than it is in the open air.

How do the flowers protect themselves in the rain so that the raindrops should not beat on the petals, break the pestles and stamens and wash away the pollen?

Who protects the tender flower that has neither roof nor umbrella over its head?

The flower is used to protecting itself. Look at a field dandelions on a rainy day. You won't see their golden heads while in sunny weather the place is yellow with them. The thing is that the flowers have simply covered themselves with a green waterproof coat. Their little golden heads are no longer visible, there are only tight little green buds that you cannot distinguish from the green grass.

THE FLOWER OF KNIGHTS

The man was climbing up a steep mountain slope. He was no longer young and he was out of breath. Beads of sweat rolled down his wrinkled face. But the man clambered stubbornly on.

A few more steps and he saw a white flower on a ledge. The man's heart beat faster and his eyes grew moist from sudden happiness. Before him was the plant for the sake of which he had been wandering in the mountains for so many days.

When his emotion subsided, the man took a scoop out of his rucksack. He dug up the plant taking great care not to injure the roots. Then, just as carefully, he wrapped it in some moss. Having put his precious find away in his bag, he set out on his return journey. Now, his only worry was to get home as fast as possible.

The edelweiss was called the flower of knights in medieval Germany. It was found very seldom and only high up in the mountains. The man who decided to find the edelweiss had to have the patience of a knight. Only then could he hope to be successful.

An inhabitant of the austere mountains, the edelweiss developed excellent adaptability to the cold, it covered itself with a dense coat of little hairs. Even the petals of the flowers are furry.

The silvery coat keeps the plant warm and gives it a special beauty. When the edelweiss blooms in the Alps people go into the mountains

especially to find the flower of knights and take it away with them as a souvenir.

...The happy man hurried along the stony path stopping only for short rests. Soon his town came into sight. The traveller hastened his steps. He entered his house, and went out into the garden after barely greeting his family. He quickly dug a hole in the earth and planted the precious flower.

The man took good care of his beloved edelweiss, loosened the earth around and watered it with water from the spring.

The edelweiss took root but it gave the man no pleasure. Its beauty had all disappeared! From a beautiful, snow-white and fluffy flower it turned into a plain green herb. It seemed to be taking its revenge on the man who had separated it from its beloved home in the mountains.

"The flower is bewitched!" said the neighbours and advised the hapless gardener to get rid of it as quickly as possible.

Many years went by before people understood that witchcraft had nothing to do with it. The plant which was used to the cold felt very hot on the plain and shed its silvery hairs. In our times, botanists have learned to grow the edelweiss in botanical gardens. They simply keep it under an awning, out of reach of the sun's direct rays, and the flower retains its silvery "coat".

THE MIRACLE PAINT

"Borya, you're smudged with paint again!" exclaimed Mother throwing up her hands.

"Honest, Mother, I didn't touch the door," said Borya.

But Mother did not believe him any more. She thought he didn't want to tell the truth out of sheer stubbornness. She had painted the door white only that morning and Boris had smudged his trousers with paint inside of an hour. Now he had another spot, on his coat this time. Wasn't Mother right?

But Borya was not to blame at all. He didn't touch the painted door. The whiting was not to blame either. The true culprit was right there beside them though neither Boris nor his mother took any notice of it.

We seldom stop to think how the plants live. The poor, "homeless" trees have to stand the rain, the wind, the snow and the hail. They stand unshielded out in the open in the winter cold and the summer heat.

The bark protects them from the cold, but how do they shield themselves from the heat?

Also with their bark. The trees have no other covering. They cannot change from a winter coat into a summer dress like people can. They

have to do with the same clothes their whole life. But it seems that's not so bad in the long run.

In Central Asia they wear wadded coats the year round, even in the scorching sun. The cotton-wool keeps the hot rays out better than a thin shirt.

The porous bark is very much like a wadded coat. It is good for any weather. Fridtjof Nansen, for instance, used it to cold-proof the cabins of his ship. In tropical countries, they make helmets out of cork to prevent people from getting sunstroke.

A thick "coat" keeps the heat out especially well. But not all trees are equally lucky. Some have a thicker coat while others have a thinner one.

The birch is the most unfortunate among the trees in the central regions of the country. It has the thinnest bark.

What helps it bear inclement weather?

Its colour.

What is the colour they paint refrigerators?

White.

And the tops of aircraft which is turned to the sun?

Also white.

And the structures on the deck of passenger ships?

White again.

Is that plain coincidence?

Not at all. The white colour reflects the sun rays best of all. That is why a white surface does not grow as hot as others.

That is the way the birch keeps out the heat. The trees with the thick bark are well off even without the white colour but the birch with its thin "coat" cannot do without it.

The botanists' name for the birch is betula and the white substance with which it paints its bark is called betulinol. No other tree has such a "paint". That is why the birch looks so pretty.

It was the betulinol that played a practical joke on Borya. The boy had leaned against a birch and it had soiled his jacket. There was no great misfortune in that because the spot disappeared without a trace after Borya rubbed it with a brush.

UMBRELLAS FOR PLANTS

It is hot in the steppe in the summer. The earth and the air are as dry as can be.

People look at the sky hoping to see some rain clouds but all in vain.

A man can always protect himself from the direct rays of the sun by opening an umbrella or putting a broad-brimmed hat on his head, and he'll feel immediate relief.

The animals of the steppes have another means of protection. The gopher, the hamster and the mice sit out the heat in their burrows. But the plants have neither umbrella nor burrow. They have to stand and pine for hours under the scorching sun.

Not all plants suffer from the heat as you will see.

The most frequent grasses you come across in the steppes is the feather-grass, fescue and dogbane. All of them have very narrow leaves and with good reason—a narrow leaf evaporates less moisture.

But sometimes the heat is so intense that even narrow leaves are no protection. Then the grasses curl their blades into scrolls, so as to diminish the area turned to the sun. The evaporation of the moisture diminishes as well, so now the heat is not so dangerous any more.

The desmodium, which grows in India, protects itself from the heat in a more remarkable fashion. There are small leafs attached to the edge of its large leaves. In the night and early in the morning, there is nothing unusual about the shrub. But the minute the sun heats the temperature of the air to 20° C, the desmodium comes to life. The little leaves surrounding the large leaves start to move up and down all the time. They fan the large leaves like faithful servants till the heat starts to let up.

In the prairies of America there is a plant called silphium which is completely flat. It looks as though it has just been taken from under a press. The edges of its leaves are turned north and south, that is why the sun does not overheat it even at noonday.

A TRANSPARENT DRESS

You remember Andersen's story "The King's Fashionable Clothes", don't you? There were two rascals who deceived the King and his courtiers. They assured them they would make a wonderful cloth which became invisible to fools or men who wrongfully occupied their offices. Actually, all they did was wave their arms.

Naturally, nobody could see their cloth, but no one wanted to appear a fool or that he was unworthy of his post, therefore everybody lied. The King walked about the city absolutely naked while everybody cried in mock admiration:

"Oh, what beautiful new clothes the King has on!"

Reading the story you evidently thought: "What simpletons lived in that kingdom. If I were in their midst, I would have caught the rascals in their lies! I'd proved there can be no invisible clothes!"

Now what would you say if I insisted that such clothes do exist?

You would say I wanted to poke fun at you.

Don't be in a hurry to say so, because you'll make a mistake. However, I must admit at the start that neither kings nor humble folk wear such clothes. It is the privilege of plants only, and not all plants at that.

Where can we find such fortunates? Anywhere and everywhere, only we never pay much attention to them—after all, invisible clothes are unnoticeable, aren't they?

Those who would like to find such plants should use their noses rather than their eyes.

It is beautiful in the steppe in the summer. The herbs and grasses smell so wonderful, you think someone has sprinkled them with perfume. It's a pleasure to lie in the grass and inhale its lovely fragrance.

But why do the steppeland plants set up a whole "perfume-making factory"? We know that plants never waste their efforts.

It appears that smell is also a means of defence. It is caused by the evaporation of volatile oils which plants exude in great quantity in the daytime and evening. The vapour envelopes the plant like a light cloud. In the night, such a "wrap" keeps away the cold, while in the daytime it protects the plant from the heat.

Absinth is terribly plain, a real Cinderella compared to the "fashionable beauties" of the garden. But it seems this Cinderella wears a wonderful "dress" that is fragrant, transparent and very practical, a dress that Andersen's King never dreamed of.

THE DEVIL'S WOODS

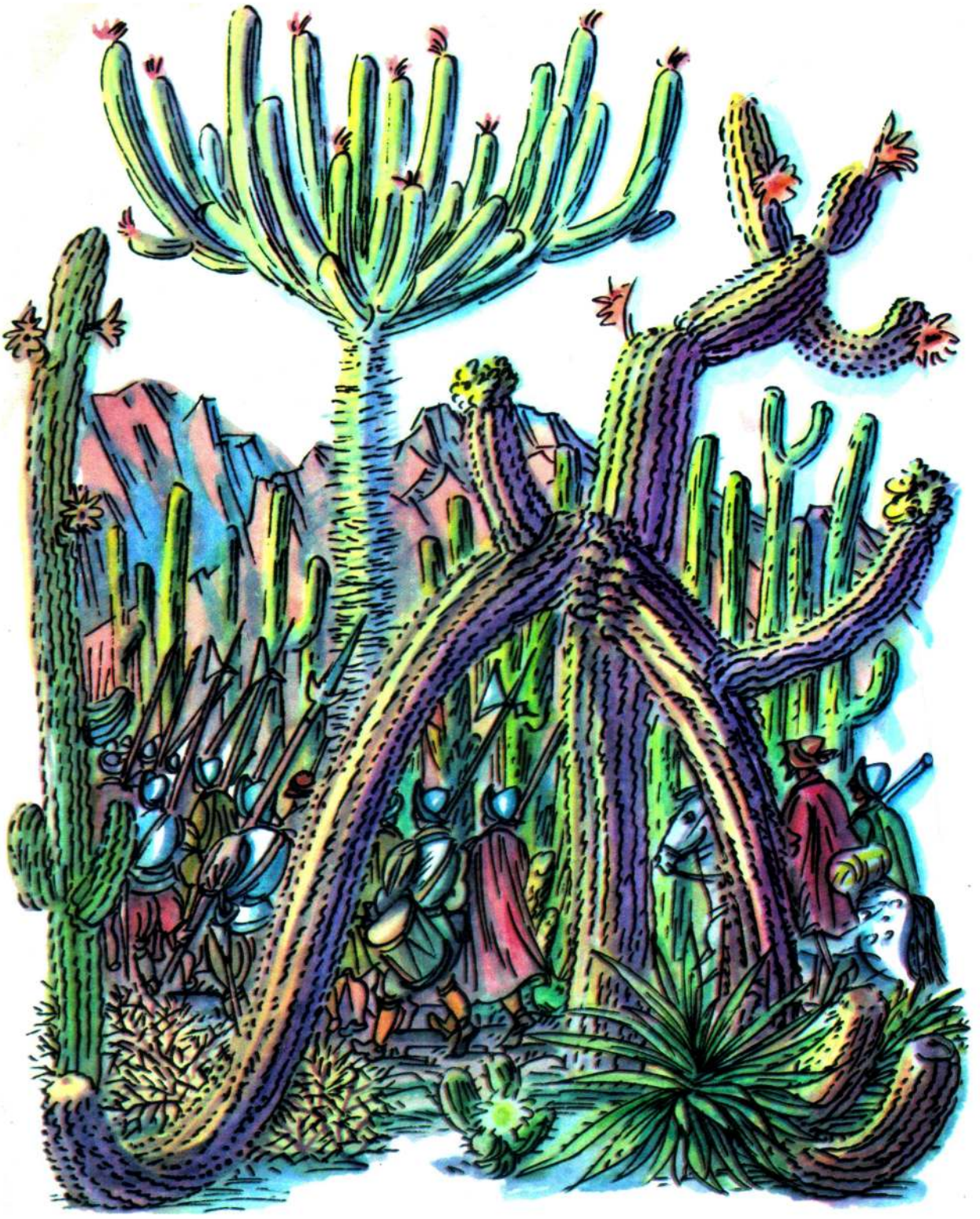
A detachment of Spaniards galloped along the Mexican uplands and looked around them with wonder. In the distant and puzzling land everything looked so different from home. The language and the customs of the aborigines were strange and the heat of the desert was unbearable. They were suffering from thirst all the time.

The plants were not only strange but frightening, and looked like ghosts in the night. The superstitious Spaniards were filled with fear, their hands reached hurriedly for their crosses while their lips mumbled prayers. The Spanish conquerors called the plants and trees in the new land "the devil's woods" and the name stuck.

Humans, animals and plants—every living being has a hard time of it in the desert where there is no rain for months on end. How do the plants survive in such conditions?

When drought comes to India or tropical Africa some trees shed their leaves just like our trees do with the coming of winter. They do so also for the purpose of saving precious moisture.

But each tree parts with its foliage in different fashion. The baobab in Africa frees itself completely of its greenery for several months and may appear to have dried up. The hardier ceiba which grows by its side finds it sufficient to cast off only a part of its leaves. It looks very funny when it



does so: half of its crown is green while the other half is bare, as if some prankster had picked part of its leaves. But the moment the rains start, the tree turns green again.

The plants and the animals of the desert have much in common. The camel, for example, can do without water for half a month. But the minute it sees a longawaited stream it can drink about ten buckets of water at a gulp and store it up.

The trees of the desert are like camels, they also store up a large quantity of water, and use it sparingly, that is why they can do without the rain for many months.

There is a tree like a flask that grows in Western Africa. Its porous wood absorbs water like a sponge and the trunk swells to monstrous size, then, in the dry season the tree gradually grows thin.

Then there is a tree in Australia that the people call the bottle-tree. It actually reminds one of a gigantic bottle. The similarity is not purely external: the thick part contains two capacious reservoirs filled with water, and these help the tree to live in the most arid regions of Australia.

There is another bottle-tree growing in Cuba, the pot-bellied palm called kolpot-rinax. Its trunk looks like python that has swallowed a goat which got stuck in its middle. The "goat" is nothing more but a reservoir of water.

All these camel-like trees do not look alike in the least. The only thing they have in common is their foliage.

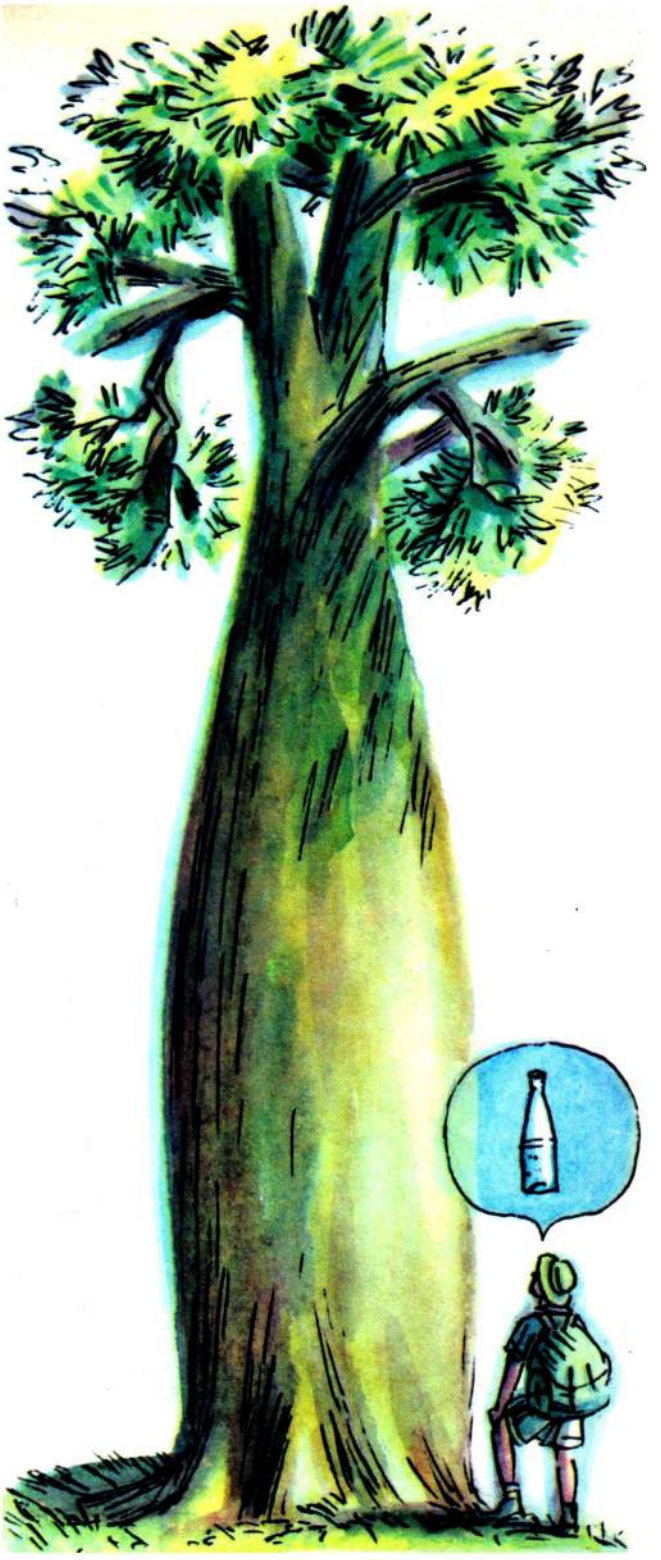
The Mexican cactus, however, has no leaves at all. Instead, it has thorns that stick out in all directions. They help the plant protect itself from animals and from the heat. The thin prickles, in contrast to the leaves, do not evaporate moisture. All the parts of the cactus help it to preserve moisture. It has a tank of soft tissue inside its swelled up stem. On the outside it has a coat of thick skin which is covered with wax so that the moisture should not seep out.

It is as hot as in a furnace in the Mexican desert in the daytime and everything that can run, crawl or fly hides in cool, sheltered nooks. Even the earth cracks under the merciless rays of the sun and only the cactus stands immobile. It looks as though the heat of the desert does not affect it. It can quench its thirst from its stores

of water for over a year. But once the rains come, its roots pump an immense amount of water into its "tank" once again.

Large cacti have very large stores of water. The cereus, the huge "candlestick", which sometimes grows as high as a 7-storey house, pumps up to three tons of water into its column-like stems. That's a whole cistern for you!

Mexico is the birthplace of the cactus. It is the staple food of the poor. Its stems go to make soups and salads, its juicy fruit are used for compot and jam. Even the seeds are put to use, they go to make porridge. But of the greatest value is the water stored up in these plants. It has saved the lives of many travellers dying of thirst in the waterless desert.



UNDERGROUND ANCHORS

Once, when I was looking at the tropical plants in the Moscow Botanical Gardens, I stopped before a liana. I was astonished by its snake-like pliancy. The tenacious branches of the tree grasped any support they could find and clambered up the walls of the hothouse right up to the roof.

Then I took a look at the tub in which the liana grew. The strong oaken boards had split at the bottom and I could see the strong roots. The cement floor was also cracked as if someone had struck it with a pick.

"What happened?" I asked with wonder.

"The usual thing," explained the hothouse worker. "There wasn't enough room for the roots so the liana broke the tub and then the floor."

Sometimes we come across a birch-tree growing on an old stone house, or some grass that has thrust itself up through the cobblestones in the street. That's also the work of the roots. Nothing can keep them down, they can grow through brickwork or swell up the asphalt.

Where do the roots get such strength?

The snowdrop looks so frail and few people guess that it has such hidden strength. The stem, the leaves and the roots all consist of the smallest cells. Each cell is like a tiny ball, only it is filled with cellular juice instead of compressed air. And the pressure of the juice is very strong.

A rubber ball bounces from a pressure of two atmospheres, a multi-ton tip-up lorry rolls along on tyres which have 5 atmospheres, but cellular

juice has a pressure equal to 100 atmospheres! Even the steam-boilers of the most powerful engines do not have such pressure. It is this pressure that enables roots to "drill" through the hardest ground and go deep down.

But why do the roots have to do such hard work? Why couldn't they grow just below the surface and not drill down so deep?

What about the wind! It makes short work of lazy plants. That is why the trees go so deep down into the earth. For a tree, roots are the same thing as an anchor for a ship—they hold it firmly in place.

But the wind is treacherous, sometimes it grows so fierce that it tears the roofs off houses and the masts off the electric power lines. That is what happens on level ground, but in the mountains the wind is even stronger. How are the trees to protect themselves there?

Those who have ever forded mountain rivers know how hard it is to keep one's balance in the strong current. Mountain-dwellers have thought of a simple and reliable way of walking across: two or three men put their arms around each other's shoulders and form a circle so they have four or six legs instead of two. It is so much easier to stand on your feet that way.

Trees growing in the mountains come up against similar difficulties. Only they have to stand up to the pressure of the wind instead of the water, besides they have no arms, nothing to catch hold of each other with. On the other hand, they have their roots. They are as good helpmates as any!

The trees stretch their underground arms a long way and touch their neighbours. But no matter how near a neighbouring tree is, it is impossible to get support from its roots. Meanwhile, the wind keeps blowing this way and that. The swaying movement is transmitted to the roots that rub against each other and wound their neighbours. The injured spots secrete a sticky substance which heals the wounds.

When the roots of one tree are close enough to the roots of another it sometimes happens that their roots get glued together by this substance and they join and grow together. Then it's hard to tell the roots of one tree from the roots of another.

Of course, all that happens by accident but it's a happy accident for the trees.

PROPS FOR GIANTS

The streets of Conakry, the capital of Guinea, are busy and bustling from early morning. The glib-tongued tradesmen invite the passers-by to inspect and buy their wares, which are laid out on the ground for all to see. You can choose anything that appeals to you.

The tradesmen are fortunate too, they have no need to set up any stalls. The stalls have been built for them a long time ago. The hospitable ceiba, the favourite tree of the Africans, had taken care of that. You will find stalls, or tents, wherever you find the ceiba.

It is true that the stalls are somewhat unusual, they have neither the back nor the front wall, and they are made of the roots of the tree that have come out on the surface. The roots are high and flat, like walls. They spread fanwise from the trunk, so the stalls surround the trunk.

The tradesmen do not feel the heat because their heads are shaded by the ceiba's broad crown. Besides, the fruits keep well in the shade.

Why does the ceiba "build" these "stalls"? It is obvious the tree does not do it out of concern for the tradesmen.

It is the wind that makes the tree behave that way, and it gives no peace to the other trees either.

On sandy slopes you may see pines that look as though they have come out of a fairy-tale. The powerful trees seem to be lifting high their snag-like legs all ready to run or dance to the whistling of the wind.

In reality the pines have no wish to dance at all. The restless wind blows the sand from under their roots, while the trees dig deeper and deeper into the ground in their urge to survive. The tops of the roots are bared that is why they give the impression of being on stilts. They can stand that way for many years defying the wind.

Everybody is familiar with maize, and most people are interested in the cobs and not in the roots, though these are curious things well worth inspecting.

Maize has a tall and thick stalk, broad long leaves and heavy cobs, and appears top-heavy. But it does not fall even in a severe wind because it has additional roots that come out on the surface. Like props they support the stalk in windy weather.

The banian-tree that grows in India is a gigantic relation of our indoor ficus. Tourists take one tree for a whole grove because it has so many trunks—up to a thousand sometimes. These trunks are quite unusual.

The banian has heavy branches that need support, that is why it has aerial roots growing on its branches. Little by little, they grow long and reach the ground. As the years go by, these supporting roots thicken and then it is difficult to distinguish them from the main trunk that gets lost in their midst. That is how one tree produces a whole grove. So now even a hurricane will do no harm to the heavy crown of the banian-tree.

In the humid tropical jungles of Africa, America and Asia there are some remarkably slender trees. Their elegant trunks rise to the sky like light columns and there is a wide-spread crown on top. The trees look like umbrellas with very long handles. If the trunks were shorter and the crowns lower it would be easier for them to stand up to the wind. As it is, you feel the slender giants may keel over any time.

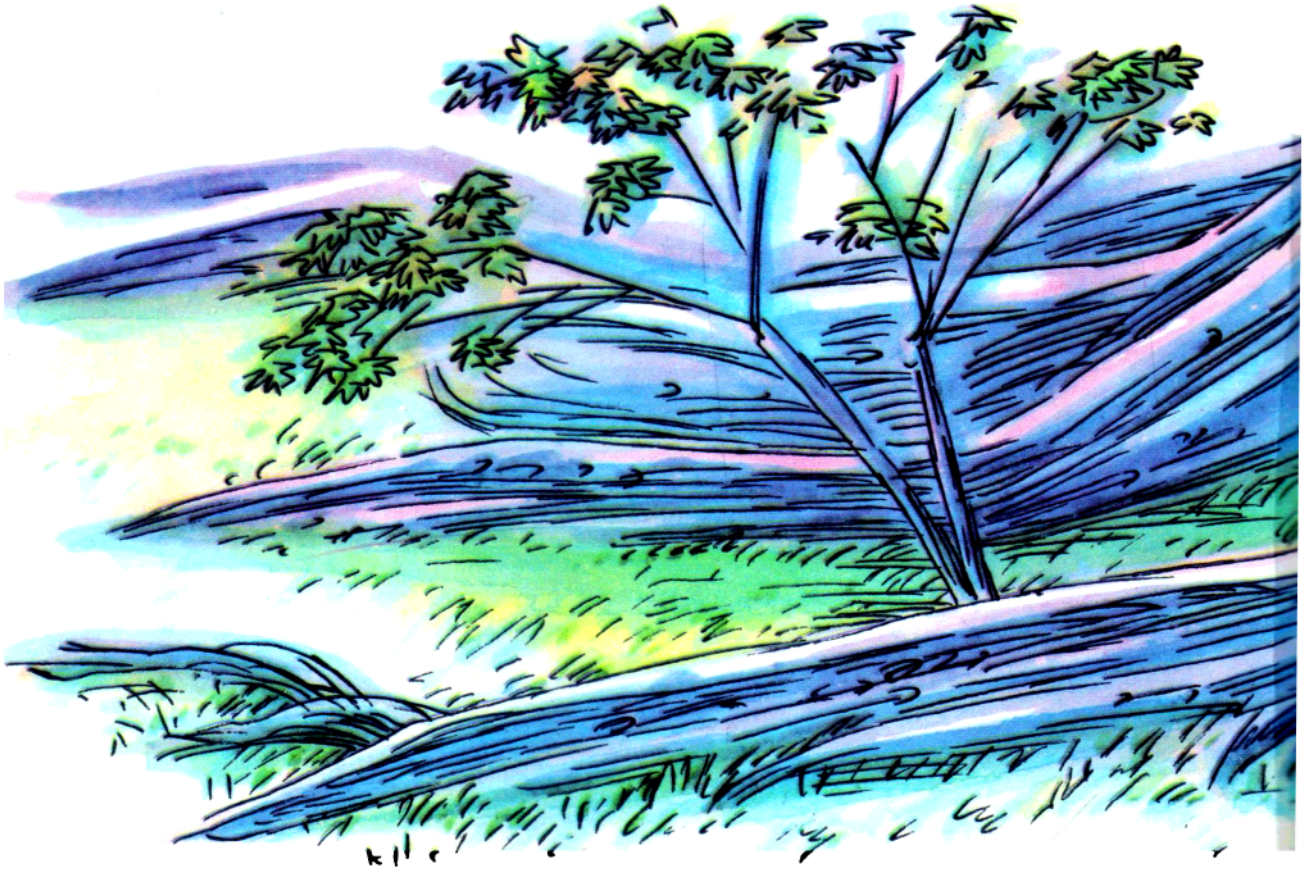
To all appearances, the only way for them to save themselves is to grow deeper roots.

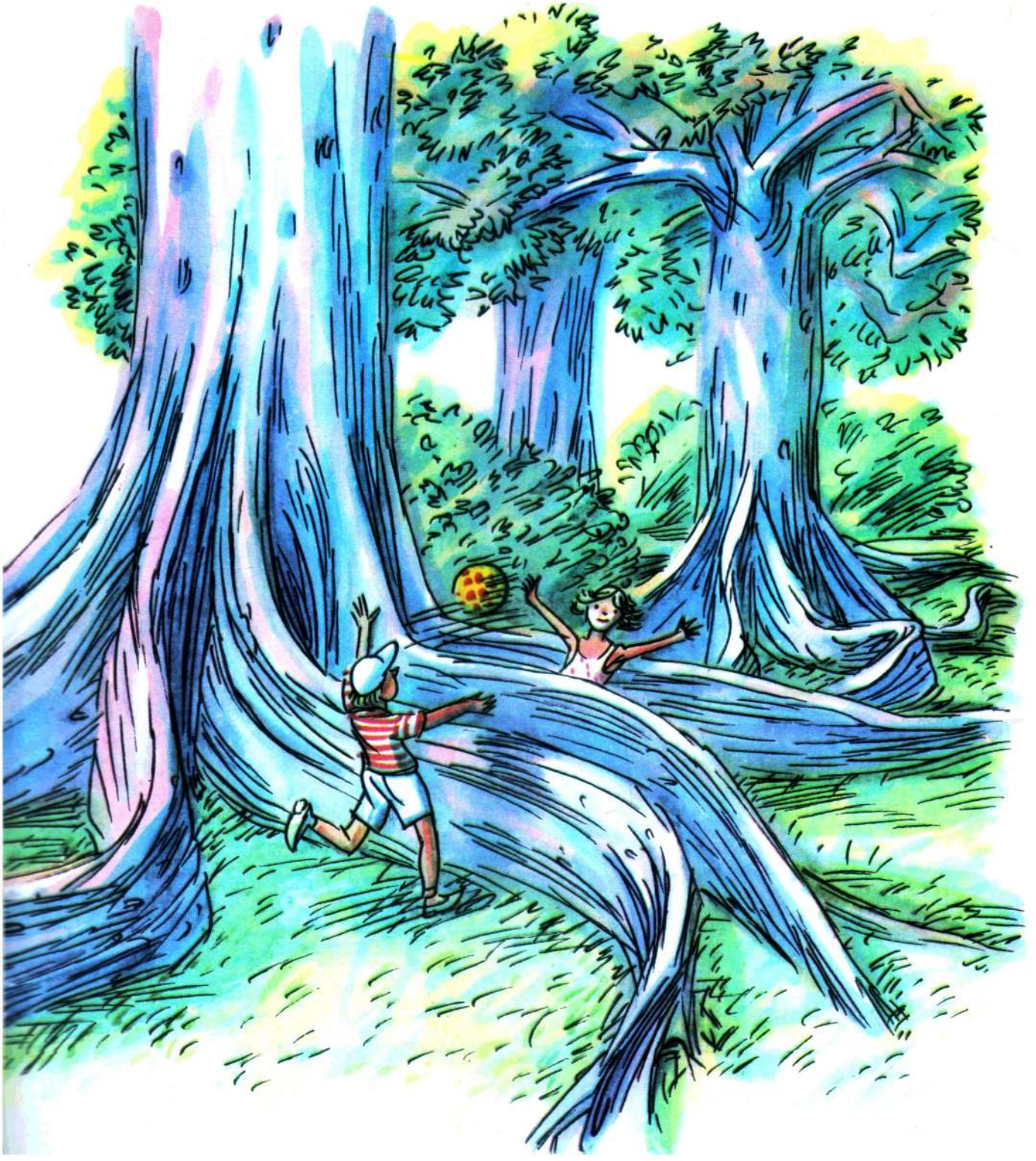
But that is not always possible because some of them grow in swampy ground while others on stony ground. Deeper roots would not be of any help.

These umbrella-like trees have adapted themselves to their surround-

ings in their own way. They have huge supports that run in all directions from the lower part of the trunk. They look very much like broad planks with one edge pressed against the trunk and the opposite edge pressed firmly into the ground. For that they are called buttress-like roots. They rise to about six metres up the trunk and stretch several metres away from its base.

The ceiba, the favourite tree of the Guinean tradespeople, also belongs to their family.





STRAW SKYSCRAPERS

"Come to your senses, Volodya!" his friends persuaded him.

"Listen to well-intentioned advice, Vladimir Fyodorovich. Don't make life difficult for yourself!" advised the professors.

Everyone V. F. Razdorsky talked to at the time regarded his idea with disfavour. They believed there was no sense in becoming a student again in order to study plants when he had only just received a diploma of an engineer.

But Vladimir Razdorsky believed it was worth it. Being an engineer helped the future Soviet scientist understand the complicated problems that had long occupied the minds of botanists. For instance, why could a blade of grass withstand a hurricane and remain unharmed, and why were skyscrapers, built according to the laws of mechanics, inferior to it in strength?

The more Razdorsky pored over these questions, the better he realised that constant struggle with the wind had helped plants to choose the most perfect constructions.

Naturally, he had seen the wheat stalk more than once, but only when he took up botany did he really appreciate its merits.

A wheat stalk is a straw, a thin tube with knotty partitions at intervals. The emptiness inside the stalk makes it lightweight while the partitions lend it strength. Like an experienced engineer, the plant builds economically and well.

Wheat grows about two metres high while its stalk is a mere 2 to 3 millimetres. That means that the length of the stalk is a thousand times greater than its diametre! For builders who construct television towers, such correlations are a dream so far. In addition, we have to bear in mind that the wheat stalk has to carry an ear of corn on top, which is far heavier than the stalk.

It is excellent building material like bast fibre that enables the stalk to bear such a load. These fibres are very light and flexible and are as strong as steel. That is why the stalk is hollow and not solid.

All grains have such straw stalks and some of them are very tall indeed.

In Africa they have what they call "elephant grass". It is as tall as two men. Reeds are not any shorter. But the champion among them is the bamboo which in the tropics grows as high as a 15-storey house!

Besides making a careful choice of the building material for their flexible stalks, plants are clever in their choice of constructions. When you have the chance, take a good look at the rails of a railway or the steel beams that are used for building. Their butt-ends look like the letter "T" or two "T"s whose "soles" have grown together. Such a shape makes the rails and beams especially strong. The stalks of many plants are built of similar, though very tiny, constructions.

Bulrushes, the inhabitants of lakes and rivers, have fibres that stretch the length of the stalk and join each other in the form of a ring. The result is a light and surprisingly strong stalk.

Such constructions enable majestic palm-trees, and not only grasses, to withstand hurricanes. They bend almost to the ground but do not break. The minute the storm is over, they straighten up like springs.

Razdorsky had to spend many long years studying plants in order to discover the secrets of their building technique. But then he was able to help engineers create better constructions for buildings. Taking stock of his life in his old age, Professor Razdorsky was glad he did not give in to the persuasions of his friends at the outset of his career.

THE "FIRE-TAMERS"

Plants have a lot of enemies but the most terrible is fire. It can burn down a whole wood in the space of a few hours. The fleet-footed animals manage to save themselves by running away from it, but what are the poor stationary plants to do? Bow before such bad fortune?

Strange as it may seem, there are trees, shrubs and even herbs that are fortunate enough to resist fire.

The African savanna is a pitiable sight after a fire. It is all smoke, soot, ashes and smouldering brands instead of blossoming trees. You touch a trunk and soil your fingers as though you've touched coal. Then comes the rainy season and the riotous African spring comes to the savanna, and life in it wakes up again.

Young grass shoots up boldly and colours the entire savanna an emerald green.

What about the trees?

They are not to be outdone by the herbs. The charred kusonia covers over with tender green foliage as though nothing had happened. The sleeping buds wake up on the branches that were fire brands not so long ago. Sprouts and bright leaves with a reddish tint grow out of the little buds. The kusonia comes to life: like the legendary phoenix it is born out of the ashes.

The fire is more merciless with another short tree that grows in the savanna, the lophira. The fire destroys it completely and only the roots remain.

After the rains you see greenery appearing on its charred stump. Some time later, a trunk grows out of the stump and the tree covers itself with leaves and flowers.

The larger trees in the African savanna, the baobab and the bombyx, stand the fire even better. Their thick bark does not burn but only cracks from the flames. Soon these cracks heal and only scars remain in their place.

The eucalyptus of Australia saves itself by casting off its burnt bark which was dead even before the fire and hung down in strips from its trunk. A new bark had grown under the old and the fire had not touched it.

The sequoias, the tallest trees in the world, grow in North America. They are the broadest across and the most ancient of the trees now growing on Earth.

The sequoias have a lot of other fine qualities. Their wood does not rot and is immune to harmful fungi and insects. It can also stand the fire. The thick porous bark of the giant is only charred on the surface. The fire is unable to penetrate its thick "armour".

But the most astonishing thing is that fires are not the enemies but the friends of the sequoia!

The tree has very small seeds with a very small supply of nutritious substances and they cannot keep for a long time. If there is thick grass growing around the tree, the seeds cannot reach the ground for a long time and perish.

That is when a fire is welcome, it destroys the undergrowth and allows the seeds to sink into the ground.

Scientists have noticed that since the time fires stopped raging in the preserves where the sequoias grow, there have been practically no new trees. The foresters grew worried. Now they are discussing ways of destroying the grass that grows under them.

Fire-resistant plants are no rarity in the USSR. The pine has a thick bark and it is not afraid of low fires. The salt crust on the leaves of the tamarisk that grows in the saline steppes protects it from the fire. Other fire-repellents protect the bearberry and cat's ear.

The buckwheat that grows in Sakhalin is extremely fire-resistant.

They even tried pouring kerosene over it and still it did not burn!

The researchers at the Moscow Agricultural Academy propose their own methods of fighting forest fires. Prominent among all the technical means is the planting of fire-repellent trees and grass. In several years' time, these plants will grow into wood belts which will protect their more vulnerable brothers from the fire.

LILY OF THE VALLEY: HANDLE WITH CARE!

You see now how many remarkable means plants have to protect them from the frost, the heat, the storm and the fire. And they can also stand up to animals and insects.

But there are still a great many things that the denizens of the forests are capable of. Every year we discover new secrets even about the plants that we believe we know well.

Recently, botanists have discovered that mustard, the mustard everybody is familiar with, is unusually resistent to radiation. It has special substances that safeguard it from this particular danger. When these substances were injected into beans they were capable of resisting radiation sickness.

The poplar is a tree that grows almost anywhere. One poplar that grew near a thermopower station that emitted a lot of smoke, shed its soot-covered leaves five (!) times in one season and grew new ones. If the poplar did not have this remarkable capacity it would have suffocated.

Take the myxomycetes, for instance. No one ever pays any attention to this sickly-looking mushroom. However, it is capable of performing such wonders that botanists merely raise their hands in wonder.

If you step on it, nothing but slime remains. But the moment the

evil-doer is out of sight, the myxomycetes begins to piece itself together. First the stem, then the hat, which looks very much like a lemon, grows out of the slime. Wouldn't you call that a miracle?

I could give you many more examples but I think it is quite clear by now that plants are capable of doing amazing things to their self-defence as though they have charms that protect them from all misfortunes.

And yet there is one offender before whom the green world is completely helpless. No matter how strong a tree may be, it cannot defend itself from a man who comes up to it with ill intentions. It takes a sharp saw only a few minutes to fell a strong forest giant which has taken hundreds of years to grow.

There was a time when Earth was all covered with forests. Today, even the impenetrable jungles have grown sparse and continue to diminish before the onslaught of man.

To this day the Africans set fire to the savanna in order to clear the land for cultivation. Very often the fires spread to the nearby forests and valuable species of trees are burned down. In time, the sites of the fires grow over but, as a rule, with small and worthless trees. As a result of these "man-made" fires and thoughtless felling of trees, there is very little left of the famous ebony tree that the continent was so proud of once.

There was a time when the land which is now Lebanon was famous for its cedars. They were felled by all who needed them: the Phoenician merchants who built ships out of their wood, the ancient Egyptians who used them for beams in their shrines, the Arab Caliphs who wanted them for their thrones and sarcophaguses. The strong, resinous and fragrant Lebanon cedar did not succumb to fungi and pests, but it was helpless before the axe. Now only a few rare groves remain of the vast cedar woods. The mountain slopes turned bare, the rains and winds carried away the fertile layer of soil and caused landslides. Only the green cedar on the national flag of Lebanon reminds people of the former splendour of the tree.

More forests have been preserved in the USSR than anywhere else on Earth, but even here their area is diminishing all the time, because we need wood for our factories, mines and school buildings. You can't make a door, or a desk, or a pencil or paper without wood. The thing is not to forget the golden rule: "When you cut down a tree, don't forget to plant two!" Then we shall never destroy our forests.

Nature suffers not only at the hands of wood-cutters but many other

people as well. There are lazy picnickers who find it simpler to cut down a young birch instead of going into the wood to gather some brushwood for their bonfire. It's a great pity, because the damp wood doesn't burn well, while there is so much dry brushwood lying about in the wood, but the thoughtless people ruin trees for firewood.

There are boys who break off the branches that grow low on the trees, play with them for a little while and then throw them away without a thought. There are others who cut out their initials on the bark with penknives, just because they have nothing better to do.

What about those who bring home armfuls of flowers when they return from a walk in the outskirts of the city!

Without even noticing it people do Nature irreparable harm. According to the calculations of the scientists, every week one variety of plant disappears irrevocably from our planet. Plants with beautiful flowers are especially unfortunate. If people will not learn to care more for Nature, we shall not see any lilies of the valley in our woods in a few years' time. They will all be destroyed.

That is why the Soviet government is taking urgent measures to save the vegetative wealth of our fields and forests.

Picking lilies of the valley, bluebells, violets, water-lilies and other flowers in the forest-park zone of Moscow and the Moscow Region has been forbidden as of spring 1977. In some areas more than a hundred varieties of rare plants have been taken under state protection.

The Young Pioneers of the land assist the foresters in this important work. They organise campaigns called "Lily of the Valley: Handle With Care!" or "White Water-Lily: Handle With Care!"

Take their example. Don't do anything to harm plants when you are out in the fields and forests. Don't forget that though the plants can protect themselves, they need your protection!

REQUEST TO READERS

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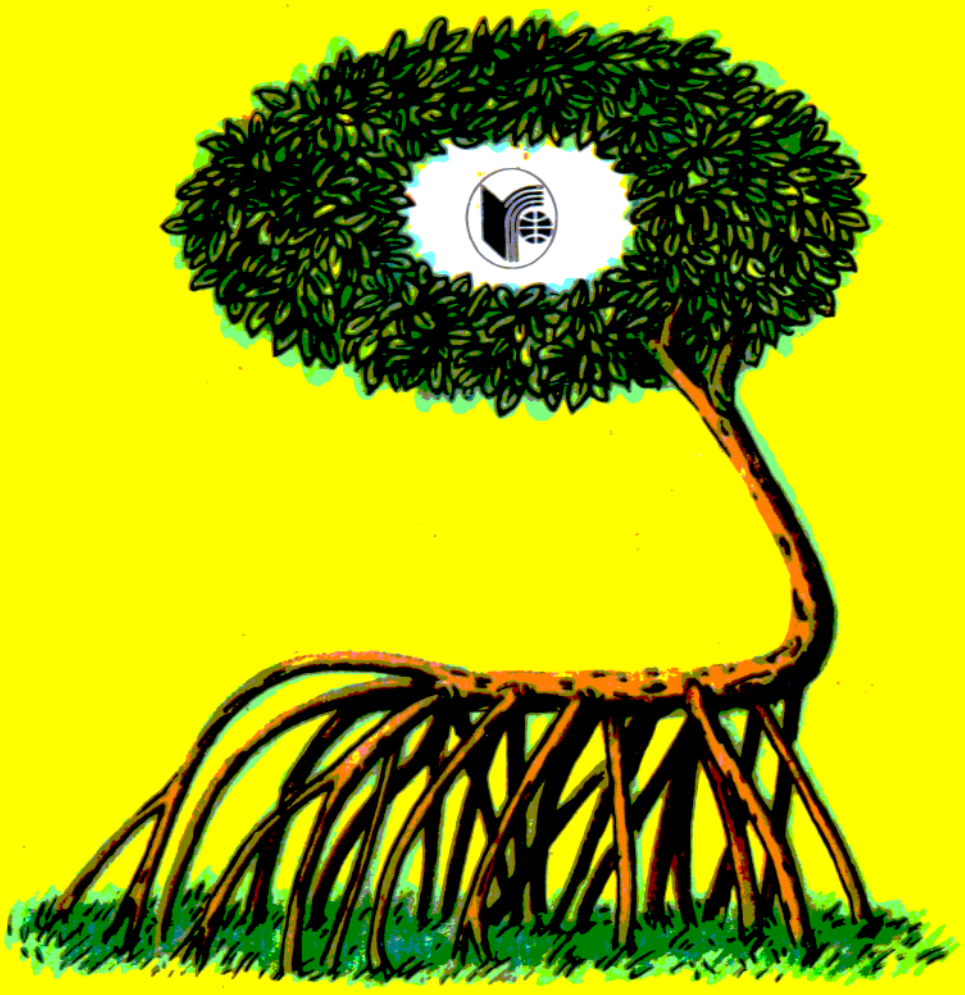

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